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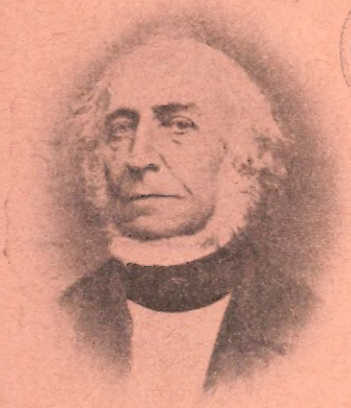

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PHILADELPHIA:
ENTOMOLOGICAL ROOMS OF
THE ACADEMY OF NATURAL SCIENCES,
LOGAN SQUARE.

Entered at the Philadelphia Post-Office as Second-Class Matter.

ENTOMOLOGICAL NEWS

Published monthly, **excepting August and September,** in charge of the Entomological Section of the Academy of Natural Sciences, Philadelphia, and the American Entomological Society.

ANNUAL SUBSCRIPTION, $2.00 IN ADVANCE.

SINGLE COPIES 25 CENTS

Advertising Rates: Per inch, full width of page, single insertion, $1.00; a discount of ten per cent. on insertions of six months or over. No advertisement taken for less than $1.00—Cash in advance.

☞All remittances should be addressed to ENTOMOLOGICAL NEWS, Academy of Natural Sciences, Logan Square, Philadelphia, Pa. *All Checks and Money Orders to be made payable to the* ENTOMOLOGICAL NEWS.

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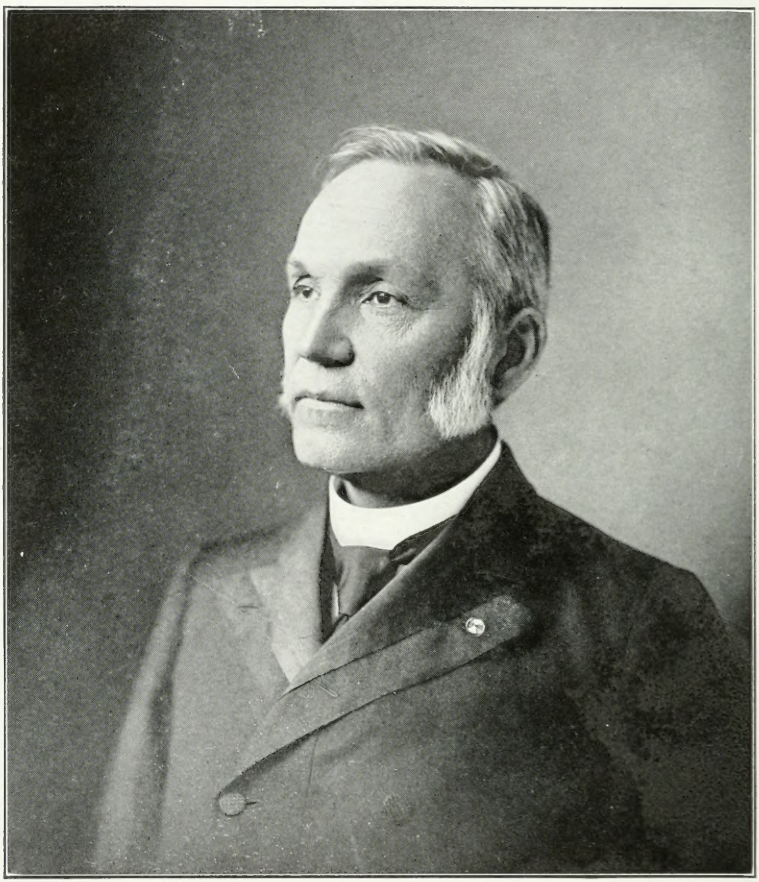

HENRY C. McCOOK.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XXII. DECEMBER, 1911. NO. 10.

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Henry Christopher McCook.

(Portrait, Plate XV.)

The Reverend Doctor Henry Christopher McCook died at his home in Devon, Pennsylvania, at a quarter past eleven o'clock, of the morning of October 31, 1911.

An editorial in one of the leading Philadelphia newspapers for the morning after his death justly remarks:

"In the death of the Rev. Henry C. McCook, D.D., Pennsylvania loses one of its most distinguished citizens. Doctor McCook was one of the "fighting McCooks" and saw himself service in the Civil War; he was a preacher of power; his long occupancy of one of the chief pastorates in Philadelphia endeared him to thousands and thousands of Philadelphians; he was a fine man, citizen and patriot. As a minister and preacher he occupied a high position, but his fame outside of Philadelphia and of the circles of his own denomination rests on wholly different grounds, and it is likely to be enduring. He was one of the world's eminent scientific observers and investigators. Especially did he achieve distinction in the most interesting phase of that department of natural history—the lives and works of ants and spiders. It frequently happens that a man may write entertainingly of these or similar subjects on a slight basis of

knowledge, and it also frequently happens that a man with deep and accurate knowledge may have no skill in description, narration or exposition. But by a peculiarly happy conjunction of capacities Doctor McCook was profoundly equipped as investigator and also a skilful writer. His works, therefore, are a happy combination of scientific accuracy and of the charm which we usually look for only in romances."

Henry C. McCook was the son of John and Julia Sheldon McCook, and was born in New Lisbon, Ohio, July 3, 1837. His father, a physician, was of Scotch-Irish descent; his mother came from New England. He attended Jefferson College, at Canonsburg, Pennsylvania (now united with Washington College, at Washington, Pa.,) receiving an A.B., in 1850. He is said to have been a printer's apprentice, then a student of law, but finally studied at the Western Theological Seminary, at Allegheny, Pennsylvania, until 1861. The Civil War breaking out, he assisted in raising the Forty-first Regiment of Illinois Volunteers, becoming a First Lieutenant and Chaplain therein. After being in charge of Presbyterian churches in Clinton, Ill., and in St. Louis (where he was exposed to much danger from cholera epidemics), he was called to the pastorate of the Tabernacle Presbyterian Church, in Philadelphia, entering his new office in 1870. The church building was then at the southeast corner of Broad street and South Penn Square, where the Betz Building now stands, but the congregation moved to a new edifice, at Thirty-seventh and Chestnut streets, in 1886. At this new location, Dr. McCook continued his ministrations until 1902, when ill-health compelled his resignation. Since then he resided at Brookcamp, Devon, about sixteen miles from Philadelphia, devoting himself to literary work.

Along with his pastoral duties, he found time to act as chaplain to the Second Regiment, National Guard of Pennsylvania, both at home and in Cuba, during the war with Spain, in 1898; to found and to act on the National Relief Commission in the same war; to reorganize a hospital in Havana; to re-arrange and mark the graves of American soldiers in Cuba; to serve as chaplain in other semi-military organizations; to take an

active part in the establishment of the Philadelphia city flag; to participate in political reform and philanthropic movements; to design the seal of the Presbyterian Church in America, and to make researches into the early history of the denomination; to write theological essays like *The Gospel of Nature* and *Ecclesiastical Emblems,* romances as *The Latimers* and *Quaker Ben,* poems, and *The Senator—A Threnody in Verse and Prose* (for Senator Hanna).

From this rapid sketch of his principal activities—and Dr. McCook was first and chiefly a clergyman—it will be realized that his entomological interests were secondary in his life. He devoted himself in this latter field to the habits and taxonomy of spiders and the habits of ants. His studies on spiders appear to have begun about 1873, to judge from expressions in the prefaces to his *American Spiders and their Spinning Work.* Professor Wheeler, in his recent comprehensive volume on Ants, cites twenty-one books and papers on these insects from Dr. McCook's pen between 1876 and 1907, and at least one more title of later date must be added to this list. Dr. McCook's entomological work, therefore, commenced after his settlement in Philadelphia, and his technical papers on both spiders and ants appeared for the most part in the *Proceedings* of the Academy of Natural Sciences and in the *Transactions* of the American Entomological Society. Dr. McCook became a member of the Academy in 1875, and served as one of its two vice-presidents, from May 23, 1882, to December, 1900. The other vice-president, for much of the same period, was the botanist, Thomas Meehan, and among other active scientific members were Leidy, Cope, Horn, Gibbons Hunt, Heilprin, Harrison Allen and Ryder.

Dr. McCook entered the American Entomological Society in 1877; was vice-president from 1884 to 1893, and president from 1898 to 1900. His last appearance at an entomological gathering was probably at the meeting, held in the rooms of the Society and Entomological Section of the Academy, on December 29, 1904, at the occasion of the meeting of the American Association for the Advancement of Science.

That part of his work on the habits of spiders and ants necessitating field observations was done almost wholly in the summers. As he wrote in one of the prefaces quoted above:

"The duties of my calling in a large city have held me rigorously away from the open country except during two months of the year. Summer vacations, and such leisure hours as a most busy life would allow, have been given to the pleasant task of following my little friends of the aranead world into their retreats, and watching at the doors of their fragile domiciles for such secrets of their career as they might happen to uncover. Occasional excursions at other times were unavoidably brief, and often broken off at the point of promised discoveries. I have, in part, indeed, overcome this obstacle by transporting and colonizing specimens, and by directing the observations of others. But, at the best, artificial conditions fall short of Nature's fulness, and no faithfulness of assistants can quite equal personal investigations."

So in August, 1876, he camped on Brush Mountain, near Hollidaysburg, Pennsylvania, to obtain the results recorded in his *Mound-Making Ants of the Alleghenies, their Architecture and Habits* (1877). Three weeks of the summer of 1877, spent near Austin, Texas, furnished much of the material for *The Natural History of the Agricultural Ant of Texas, A Monograph of the Habits, Architecture and Structure of Pogonomyrmex Barbatus* (1879), recording his conclusion that "I do not believe that the ants deliberately sow a crop, as Lincecum asserts. . . . . but, finally [he thought] that there is nothing unreasonable, nor beyond the probable capacity of the emmet intellect, in the supposition that the crop is actually sown" (pp. 38, 39), and for the description of the *Basilica Spider and her Snare* (1878). The vacation of 1879, in the Garden of the Gods, near Manitou, Colorado, ultimately resulted in *The Honey Ants of the Garden of the Gods and the Occident Ants of the American Plains* (1882). Of this work, Professor Wheeler wrote (*l. c.* pp. 367-369).

"The first to publish a trustworthy account of this, or in fact any of our Myrmecocysti, was McCook. He discovered *horti-deorum* in the Garden of the Gods near Manitou, Colorado.....effectively dispelled the notion that the repletes manufacture the honey which they contain..... [made] careful dissections and figures of the gaster of ordinary workers, semirepletes ("semirotunds") and repletes.....

and inferred....that the honey-bearer is simply a worker with an overgrown abdomen..... Although McCook gave excellent reasons for believing that the replete must develop from a worker of the ordinary type, he did not actually witness the transformation."

Dr. McCook's *opus magnus* was his *American Spiders and their Spinning Work. A Natural History of the Orbweaving Spiders of the United States with special regard to their industry and habits*, in three quarto volumes, dated 1889, 1890 and 1893 (1894). The first treats of "Snares and Nests," the second of "Motherhood and Babyhood, Life and Death," the third contains "Biological Notes, Descriptions of Species." The whole is illustrated by 853 text figures and forty colored lithographic plates of 913 figures. The author explained that he

"was induced to assume the disagreeable role of publisher by two considerations, the first the wish to be free to present the book according to his own ideas as to typography and illustration, which however, were too luxurious to meet the views of ordinary publishers. In the second place, as a commercial venture, the printing of a scientific work of this sort, with so limited a circulation, gave no prospect for remuneration for cost and care. It is indeed a work of love and must be carried forward chiefly from a desire to enlarge the bounds of truth. Morover, the cost was too considerable to warrant any Scientific Society to undertake the work of publishing from funds always too limited. The author therefore accepted the burden of cost, together with the yet more uncongenial details of selling, as a part of his task."

The edition was limited to 250 copies and the author had received subscriptions for about 140 of these at the time of publication of the second volume.

Of this work, Professor Thomas H. Montgomery, Jr., writes:

Dr. McCook's studies on spiders, brought together in the three large and beautifully illustrated quarto volumes of his work, 'American Spiders and their Spinning Work,' represent the most comprehensive accounts of the habits of spiders since the times of Blackwall and Menge. These contain a wealth of new observations particularly on the architecture of snares and nests, as well as a full taxonomic treatment, accompanied by colored plates, of the American Epeiridæ. This work is a classic of arachnological literature, and has been a powerful stimulus to other naturalists."

His later entomological publications were chiefly of a popular nature. Such were *Tenants of an Old Farm; leaves from the note book of a naturalist* (1885): *Old Farm Fairies. A Summer Campaign in Brownieland against King Cob-weaver's pixies, A Story for Young People* (1895); *Nature's Craftsmen, Popular Studies of Ants and Other Insects* (1907); and *Ant Communities and How They are Governed, A Study in Natural Civics* (1909), in which the social activities of ants and of men are compared.

Washington and Jefferson College, his alma mater, gave him its LL.D.; Lafayette College made him D.D., and honorary Sc.D., and he was an honorary member of the British Association for the Advancement of Science.

Dr. McCook married in 1861, Emma C. Herter, who died in 1897. Two children, Mrs. William Slade Clark and Captain Paul McCook, of the United States Army, survive their parents. In 1899, Dr. McCook married Mrs. E. D. S. Abbey.—P. P. C.

A new Papilio from Florida, and one from Mexico (Lepid.).

By W. Schaus, London, England.

Papilio ponceana sp. n.

♂, Palpi black ringed with ochreous before tip. Head, collar, and thorax black brown, with lateral yellow lines on frons continuing across vertex, collar, and along patagia dorsally. Abdomen dorsally black, laterally and underneath yellow.

Wings black brown, markings yellow. Fore wings: a narrow yellow fascia from close beyond cell and vein 5 to middle of inner margin; a spot above 5 more outset, and a large elongated spot above it containing a fuscous brown spot anteriorly; lunular spots above and below vein 8, oblique towards apex; a spot close to cell above 7, surmounted by short costal streaks; subterminal small semilunular spots, very small above 6, and in a nearly straight line; terminal spots between the veins.

Hind wings: the medial fascia broader, irrorated with brown on inner margin; large subterminal spots, the one on costa inset; the spot between 4 and 5 projecting inwardly, those between 2 and 4 deeply

lunular; the spot on inner margin elongated, shaded with rust brown, heavily towards base, partly divided by a transverse black spot, and surmounted by some bluish scales; terminal interspaces and margin of tail yellow; the tail straight and of even width.

Fore wings below yellowish; fuscous streaks in cell; a black shade at end of cell and along median, and on basal half of submedian; a broad postmedial black space from the much broader medial fascia to subterminal spots, its outer edge lunular; this black space is irrorated with yellow above vein 4, and from 6 to 8 forms two narrow lunules merely edged with black; termen narrowly black, with yellow spots.

Hind wings below yellow, showing the dark surface of upper side; a large black lunule at end of cell; an irregular brown postmedial space widest between 3 and 4, and almost obsolete on costa, cut by the yellow veins, and followed by light blue irrorations, narrowest between 4 and 5, widest between 2 and 3, separated from the brown space by an irregular black line, and followed on inner margin and between 2 and 3 by a black shade, and a black lunule at anal angle; a broad marginal lunular black line; some yellow irrorations along vein 4 on tail. Expanse 78 mm.

Female browner; the subterminal spots on fore wings lunular, those on hind wings between veins 2 and 5 more deeply lunular. Hind wings below more ochreous yellow, especially on outer margin. Expanse 85 mm.

Hab., Miami, Florida.

Allied to *P. aristodemus* from Haiti, and *P. temenes* Godt. from Cuba, differing in the much narrower medial fascia, the straighter row of subterminal spots, and in the markings underneath. Types in U. S. Nat. Mus.

Papilio lopiusa sp. n.

♂, similar to *P. alopius* G. & S., the tails however straight as in *P. montezuma,* not spatulate; the spots on hind wings close together, those between 6 and 7 almost suffusing; the inner row of spots larger than in *alopius,* and whiter. Underneath the single costal spot is white, not red; the inner spots between 5 and 7 are large, lunular, and suffuse with the outer spots. Expanse 82 mm.

Hab., Guadalajara, Mexico.

This may possibly be a hybrid between *alopius* and *montezuma.* Type in U. S. Nat. Mus., Washington, D. C.

Both species were collected by the writer.

A new Genus and four new Species of Aphididae (Rhynch.).

By C. P. Gillette, Colorado State Agricultural College, Fort Collins, Colo.

(Plate XVI.)

ATARSOS n. gen.

Lice in all stages without tarsi; a small pulvillus-like pad on the distal end of each tibia; moderately hairy, the hairs being capitate in all stages; cornicles short, tapering; antennæ in all adults much shorter than the body and with numerous sensoria on joints 3, 4 and 5, and with spur little longer than the joint bearing it.

Type: *Atarsos grindeliae,* n. sp.

Through the kindness of Mr. J. T. Monell, I have been able to examine mounted specimens, alate and pupæ, of *Mastopoda pteridis* Oest. Striking characters are the 6-jointed antenna with the very long third and short fifth joints, the very long filament, the long cornicles convex on the free end without flange, and the vestigeal tarsi on all legs.

Atarsos grindeliae n. sp. (Plate XVI, Figs. 1-6.)

Described from specimens taken on leaves of *Grindelia squarrosa,* at Fort Collins, Colo., May 23, 1911.

Alate Viviparous Female.—Color of abdomen dull or dusky green; head, thorax above and below, distal ends of femora, tibiae and antennæ black or blackish; eyes very dark red; on the dorsum are numerous broken transverse dusky dashes, and lateral spots. Length of body 1.60 to 2 mm.; antenna 1.10 mm.; joint 3 about equaling joints 4, 5 and 6 together (occasionally joints 3 and 4 are connate); joints 3, 4 and 5 with tuberculate sensoria about as follows: III, .40; IV, .18; V, .13; VI, .09; spur, .13 mm; terminal joints very scabrous; venation normal, the veins rather heavy and dusky; cornicles stout, cylindrical, sharply constricted close to the rather broad flange, .15 mm. in length; cauda short, broad at base and tapering to a moderately acute apex; all tibiae ending in a light pad, depressed at the center and protruding on the ventral surface and entirely without tarsi; hairs on all parts, except the cauda, capitate.

Apterous Viviparous Female.—Pale shining green in color, with antennae, at least in distal half, distal ends of tibiae and cornicles dusky to blackish; eyes red; cornicles distinctly stouter at base than

at tip; antennae about the same as in the alate form; numerous sensoria on joints 3, 4 and 5; joints 3 and 4 often coalesced on one or both sides.

The most striking peculiarity of this louse is the entire absence of tarsi in all stages. There seems to be no modification of form too difficult for nature to bring about if it is needed and if sufficient time be given. This louse is undoubtedly better able to travel over the sticky surface of the *Grindelia* leaves without tarsi than with them. Yet two other species of lice having well developed tarsi get along well enough on the same plant.

On June 17 and 18 at Fort Collins the lice were common among the young, tender leaves of the host plant, but no alate lice or pupæ could be found. The alate lice were migrating freely two weeks ago. A rather common species from Fort Collins to Denver at least, and taken many times by both Mr. L. C. Bragg and the writer.

Brachycolus tritici n. sp. (Plate XVI, Figs. 7-9.)

Alate Viviparous Female.—Specimens taken from leaves of Colorado blue-stem, *Agropyron glaucum,* at Fort Collins, Colo., May 24, 1911, by L. C. Bragg.

Head, thorax above and below, antenna, except basal portion of 3rd joint, eyes, tarsi, distal ends of tibiae, and the greater portion of the distal ends of the femora, cauda and anal plate black, and powdered with white. Wing veins also conspicuously black, stigma blackish and rather narrow and stigmal vein nearly straight; cubital twice forked; abdomen light green, the color of the leaves of the grass and lightly powdered with white; cauda stout, broad in basal portion, pointed, and more or less dusky; cornicles a little yellowish or brownish and slightly raised above the surface, not as long as broad; vertex broad and but little convex; no antennal tubercles; length of body 1.30 to 1.50 mm.; antenna .70 to .80 mm.; joints 4, 5 and 6 about equal; spur a little longer than joint 4; joint 3 a little shorter than joints 4 and 5 together. There is an irregular row of about 8 sensoria on distal two-thirds of joint 3 and about 2 sensoria on joint 4; length of wing, 2.30 mm.

Apterous Viviparous Female.—Body long and narrow, nearly parallel-sided, and rather densely covered with a fine white powder; length about 1.88 mm.; width .60 mm. The general color is pale greenish to

pale yellowish; the head, distal one-half of antenna, most of the rostrum, the anal plates, cauda and legs, especially the tarsi, dusky; eyes black. In most specimens an impressed line just inside the lateral margin extends nearly the full length of the thorax and abdomen. The legs are very short, the hind femora measuring about .34 mm.; the hind tibiae .43 mm.; length of antenna .59 mm.; joint III slightly the longest; joints IV, V and VI sub-equal; beak just surpassing the second coxae; cauda rather broad and flat, pointed, a little longer than the width at the base; length .10 mm.; cornicles very small, tuberculate, located upon joint 6; in color like the body or a little dusky.

Described from specimens taken on wheat at Fort Collins, October 10, 1908. Winged specimens have also been taken early in June and in July.

Apterous Oviparous Female.—Apparently the apterous oviparous females are exactly like the viviparous form. At least they are so nearly alike that I do not notice any marked difference in characters.

Apterous Male.—A few males were present in the colony studied. They are more yellow in color with less powder upon their bodies. The antenna is entirely black or blackish, and the other parts that are dusky in the females are dark in color in the males. Length about 1.10 mm.; width .40 mm.; length of antenna and the various joints as in the viviparous female above, or slightly shorter; the rostrum attaining the third coxae; hind femora, including trochanter .29 mm.; tibiae .40 mm. I have not been able to distinguish any sensoria upon the antenna except the cluster at the distal end of joint 6.

This is seemingly a rather rare species occurring upon grasses, and has been taken several times by L. C. Bragg upon the leaves of blue-stem, *Agropyron glaucum*, and upon wheat during the summer months in the vicinity of Fort Collins.

Chaitophorus agropyronensis n. sp. (Plate XVI, Figs. 10-12.)

This louse differs so much in general appearance from typical *Chaitophorus* species that is scarcely seems right to place it here, but I dislike to establish a new genus for it.

Alate Viviparous Female.—General color of abdomen, green; the black or blackish parts are head, thorax above and below, antenna (except basal portion of joint 3), tarsi, distal ends of tibiae, entire femora, cornicles, a spot on each lateral margin of the abdominal segments, a rather broad but much interrupted band on the abdominal segments after the first, and narrow transverse dashes between the segments, and the knobbed cauda. The wing veins and the stigma are

also black or blackish. The body is everywhere set with stout gray hairs much as in the apterous form, and is also everywhere covered with a white pulverulence. The cornicles are conical, the length being less than the basal diameter; wing venation normal, the cubital usually with two forks but the second fork sometimes lacking; the cubital cell shallow, the vein being somewhat recurved; legs short and stout; length of body 1.65 to 1.90 mm.; wing 2.50 mm.; antenna .65 mm.; hind tibiae .60 mm.; tarsi unusually long, measuring .20 mm.; joints 3 and 4 of antenna coalesced into one with no indication of the union in most examples before me, and equal in length to joints 5 and 6 and the spur combined, the spur being a trifle shorter than the joint which bears it, and this joint is fully as long, or a trifle longer than the joint preceding it; hairs of body short and stout with acute points. Cauda short with knob broad and not narrowly constricted at base; the long third joint of the antenna with 4 to 5 small circular or oval sensoria. The pupa is greenish yellow, set with gray hairs, and has very black wing pads; black markings of abdomen very similar to the alate form; a pair of very conspicuous black patches on mesothorax.

Described from specimens taken on *Agropyron glaucum* at Fort Collins, Colo., May 30, 1911. Fairly common.

Apterous Viviparous Female.—A rather long narrow bodied louse, of a rather uniform rusty yellow color when fully mature but with a distinct darker brown, somewhat broken stripe extending longitudinally the whole length of the body on either side of the median line; eyes dark red; legs and antenna dusky yellow, the latter with the terminal joints blackened; number of joints 5; joints 4 and 5 and the spur sub-equal. Antenna less than one-third the length of the body; legs short and rather weak; cornicles raised but little above the surface, broader at base than they are long; cauda knobbed; the entire surface of body set with short, stout gray hairs.

A letter from Mr. E. O. G. Kelly, dated Wellington, Kansas, October 6, 1908, states that he has taken this louse in several places throughout the Northwest, both last year and the present summer.

Agropyron glaucum is the only food plant upon which we have taken this louse. The colonies rest upon the upper surface of the harsh leaves of this grass and are usually accompanied by small ants.

Chaitophorus artemisiae n. sp. (Plate XVI, Figs. 13-16.)

Alate Viviparous Female.—Abdomen cinnamon brown, head and thorax brownish black; tibiae and basal portion of third joint of

antenna pale yellowish; tips of tibiae and tarsi very black; veins and stigma of wings dusky; cornicles short and stout and broadest at base, where the diameter just about equals the length. Length of body 1.40 to 1.50 mm.; wing 2.25 mm.; antenna 1.70 mm.; hind tibiae .85 mm. Joints of antenna: III .40; IV .29; V .27; VI .11; filament .58 mm.; sensoria about 4, on joint 3.

Described from specimens taken at Boulder, Colo., June 1, 1911, by L. C. Bragg.

I have taken the alate lice at Fort Collins as early as May 25.

Apterous Viviparous Female.—General body color almost uniform brownish black, highly polished throughout; antenna black in distal portion to the middle of the third joint; legs black except the proximal one-half of the tibiae which is yellowish in color; cornicles colored like the body, tuberculate, not longer than broad, cylindrical, without flange; prothorax with stout, blunt tubercles; body, legs and antennae with a few weak hairs; antennae not upon distinct tubercles; vertex moderately convex; cauda small, broader than long; antennal joints about as follows: III .34; IV .26; V .23; VI .13; VII .53 mm.; length of body 1.70 to 2 mm.; antenna 1.40 mm.; sensoria 1 or 2, on joint 3. Figure 13 is of a stem ♀.

Apterous ♂ ♂ and oviparous ♀ ♀ were seen in September upon the same host plant but have not been described.

While this louse does not seem to be very common, it frequently becomes very abundant upon individual plants of *Artemisia dracunculoides.*

The younger larvae are decidedly green in color.

EXPLANATION OF PLATE XVI.

Atarsos grindeliae: 1, alate agamic female; 2, apterous form of same; 3, antenna; 4, cornicle; 5, footless tibia of alate form; 6, antenna of apterous form.

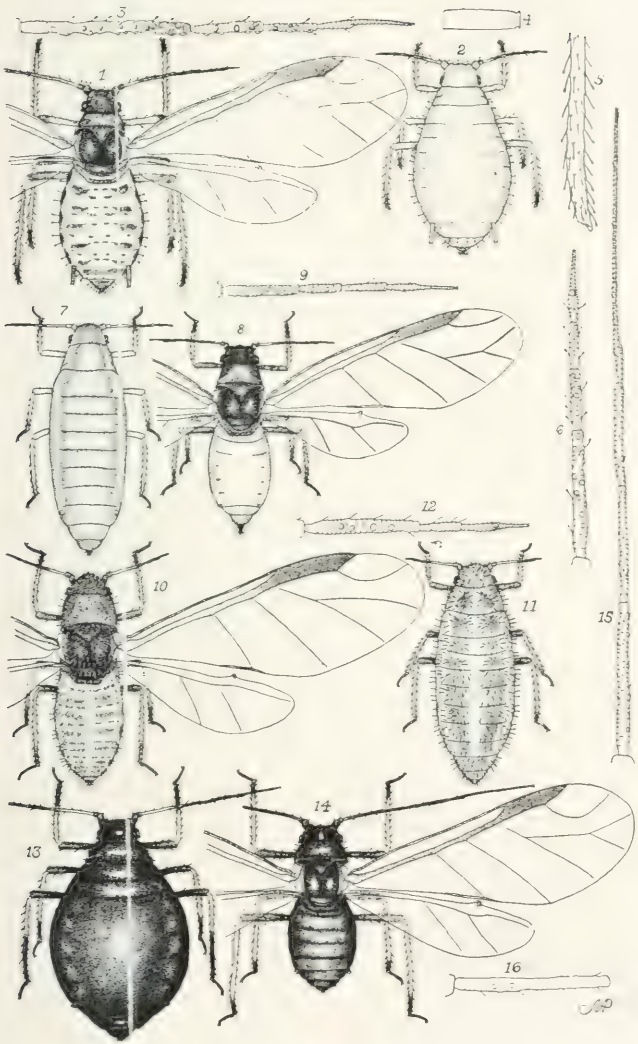
Brachycolus tritici: 7, apterous, and 8, alate viviparae; 9, antenna of alate form.

Chaitophorus agropyronensis: 10, alate and 11, apterous viviparae; 12, antenna of alate form.

Chaitophorus artemisiae: 13, stem-mother; 14, alate agamic form; 15, antenna of alate form; and 16, third joint of antenna of apterous summer form of same louse, but in most examples there is but one sensorium.

All the figures of lice are enlarged 15 times; figures of antennae and other small parts, 52 times.

Drawings by Miss M. A. Palmer.



NEW APHIDIDAE—GILLETTE.

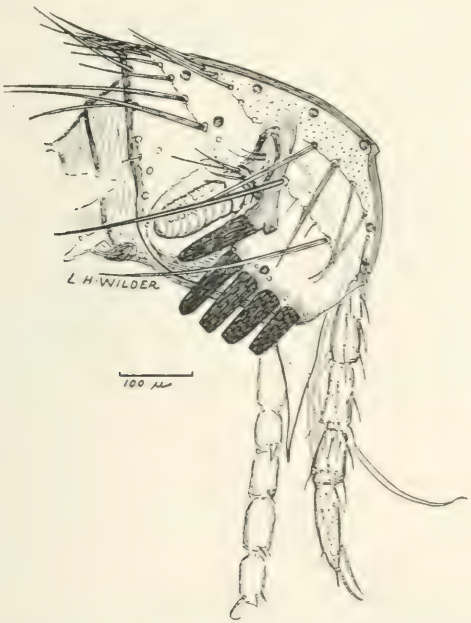
A New Flea, Ctenophthalmus Heiseri spec. nov. (Siphonaptera).

By George W. McCoy,

Passed Assistant Surgeon, U. S. Public Health and Marine Hospital Service, San Francisco, California.

Ctenophthalmus heiseri sp. n.

Female. Head.—Occiput is very gently rounded, and forms with the front of the head a distinct angle at which the occiput slightly overlaps the anterior margin. A row of five large bristles is found extending from just in front of and below the upper extremity of the antennal groove to the insertion of the maxillary palpi. Two



or three bristles are found about one-third of the distance from the posterior margin of the occiput; the upper near the midline, the lower further forward and about midway to the upper end of the antennal groove. Posterior to these is a row of about five bristles extending slightly forward; the lower being about midway between the upper extremity of the antennal groove, and the posterior border of the occiput. The posterior inferior curved margin

of the gena carries a row of five stout spines. The origin of the upper one is apparently overlapped by a chitinous projection. The three succeeding ones are of about the same length. The lowest one is somewhat shorter than the others. Near the middle of the front margin of the gena is a very large bristle. The antennal groove is about five-sixths of the depth of the head, and is not connected with the opposite antennal groove by a furrow extending across the head. Labial palpus extends beyond three-fourths the length of the an-

terior coxa. The maxillary palpus is about as long as the first four joints of the labial palpus. The first joint of the maxillary palpus is longer than any of the succeeding joints. The eye is wanting.

Thorax.—Pronotum carries a row of about ten bristles just posterior to the middle, and on the posterior margin a row of twenty stout spines. The mesonotum bears two rows of very fine hairs near the anterior margin; back of these there is a row of stouter hairs, and still further back a row of about twelve heavy bristles. The metanotum is similarly clothed except that the two rows of

fine hairs are wanting. The epimerum and the episternum of the mesonotum are joined by a strongly marked suture. The epimerum bears one hair, the episternum none. The episternum of the metanotum carries one hair near the posterior superior angle, and a very large bristle just below this.

Abdominal segments.—The first tergite bears from before backwards an irregular row of hairs, a row of about 12 long bristles, a row of shorter bristles, and six stout pegs or teeth between which are long bristles. The second tergite carries about eight teeth between which are small hairs, and behind these a row of bristles. The third carries an anterior irregular row of hairs, then a row of bristles and behind these a row of six teeth. The fourth has bristles like the third, and four stout teeth. The fifth has similar hairs and bristles, and two stout teeth near the midline. The sixth has about six long hairs on each side. The seventh carries two antipygidial bristles on each side. The second, third and fourth tergites have two bristles below the stigma; the fifth and sixth have one. The sternites each carry a row of long bristles.

Modified segments.—The eighth tergite is quite hairy. The style is cylindrical and carries a long hair at the point.

Legs.—The hind coxae have several irregular rows of short, stout bristles on the inner side below and toward the anterior margin. Hind femur has three or four hairs on inner side. The last hind tarsal joint has six spines on either margin, the last being a little shorter than the preceding ones. Between the two distal spines are two rather small spines.

Relative lengths of hind tarsal joints, 22, 14, 8, 5, 9.

Relative lengths of middle tarsal joints, 11, 8, 6, 4, 10.

Length—2.4 mm.

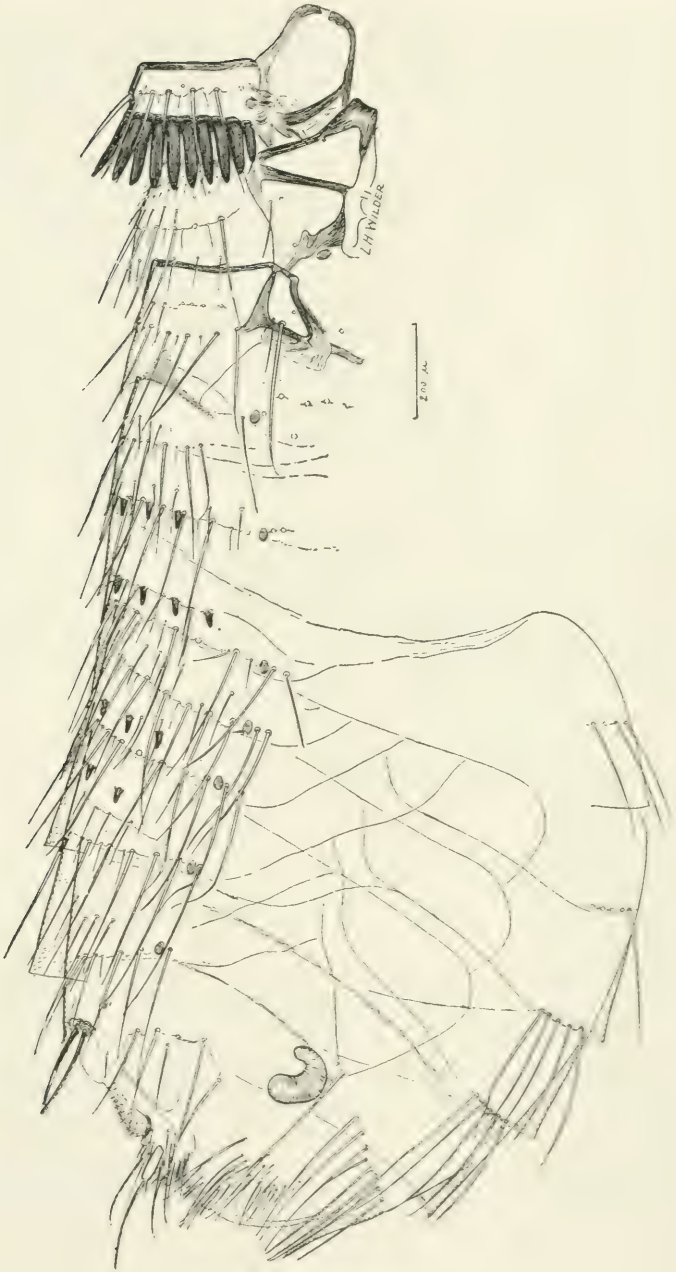
Color, dark brown.

Type specimen in the collection at the U. S. National Museum, Catalogue No. 14,154. Host unknown. Locality, Mojave, California.

The specimen was sent to the Honorable N. Charles Rothschild, who kindly examined it and pronounced it a new species of *Ctenophthalmus*.

Judged by the description of *C. fraternus*, Baker (1), the flea described here stands nearer to it than to any other American species.

1. Proceedings of the United States National Museum, Vol. 27, 1904, page 423.



Ctenophthalmus heiseri sp. n., page 445.

Studies on Costa Rican Odonata.

III. Structure and Transformation of the Larva of Mecistogaster modestus.

By Philip P. Calvert, Ph.D., University of Pennsylvania, Philadelphia, Pa.

(Plates XVII-XIX)

The early stages of this long-bodied dragon fly whose discovery and habits have been described in the News for November, pages 402-410, furnish the following

Description of the Larva of M. modestus.

Material Studied:

(*a*) From Juan Viñas, Costa Rica.

No.			Total length including caudal gills.	Body length excluding caudal gills.
48	♀	larva	(gills lacking)	11 mm.
49	♀	"	15 mm.	11.5 "
54	♀	"	10.5 "	7 "
55	♂	exuvia	(gills lacking)	21.5 "
56	♂	partly transformed		
57	♀	exuvia	25 mm.	19.5 "
58	♀	larva	23 "	19 "
58	♀	exuvia	(gills lacking)	
59	♀	exuvia	" "	19.5 "
61	♂	exuvia of March 13-16	" "	(in fragments)
1	♂	larva	25.5 "	21 mm.
2	♀	"	24 "	20 "
3	♀	"	17.5 "	14 "
	♀	exuvia of April 28	(gills imperfect)	(distorted)
	♀	" " May 1	23.5 mm.	19.5 mm.
	♂	" " Dec. 17	(gills lacking)	(distorted)
101	?	larva recovered from crop of No. 1		(in fragments)

(*b*) From Orosi, Costa Rica, March, 1911, collected by Sr. C. Picado T., and forwarded by Prof. J. F. Tristan.

♀ exuvia dimensions as above, 20.5 and 18 mm.

♂ exuvia dimensions as above, 23 and 19.5 mm.

(*c*) From Cordoba, Mexico, April, 1908, bred by Mr. F. Knab. (See Calvert, 1910.)

♀ exuvia (distorted).

Mature larva.

Description based on larvæ Nos. 1, 2 and 58, and exuviæ of 55, 57, 59, April 28, May 1, Orosi (2) and Cordoba.

Color, pale yellowish- to reddish-brown, according to the length of time which has elapsed since moulting, posterior ends of abdominal segments darker.

Head concave in the middle posteriorly for the reception of the prothorax, angles of the hind margin rounded off and clothed with short hairs and short spines. Compound eyes distinct. Ocelli indicated by three pale yellow spots.

Antennæ 7-jointed, ratios of the lengths of the joints in an antenna detached from larva No. 1 and in alcohol under a cover-glass: 18, 20, 33, 26, 19, 12, 7; joints 1 to 7 successively decreasing in thickness (Pl. XVII, Fig. 3), the distal ends of joints 3-6 a little thicker than the proximal ends; naked, except for a whorl of long and very delicate hairs on the middle of the 2nd and 7th joints and near the distal ends of the 4th, 5th, 6th, and, in some, also the 3rd, joint; in dry exuviæ, *e. g.* after metamorphosis, these hairs are often matted down on the antennæ and not visible except under a compound microscope.

Ventral surface of each gena with a row of about twenty short spines parallel to the posterior margin of the compound eye, the spines directed forward.

Mandibles one-branched, apex of left mandible with five teeth, first (counting from the dorsal margin) and third shorter than the other three, ventralmost longest; apex of right mandible with four teeth more nearly equal in size, ventralmost longest.

Maxillæ very similar to those of the larva of *Cora* described and figured* in the first study of this series, except that the attenuate tip of the inner lobe bears *two,* instead of three teeth.

Labium, when at rest, reaching almost or entirely to the hind edge of the prothorax; mentum about twice as wide at the level of the articulations of the lateral lobes as at its proximal end (Pl. XVII, Fig. 6), strongly produced distad to form the median labial lobe which lacks the slightest trace of a median cleft, but bears 32-41 crenulations on each side of the median line (Pl. XVII, Fig. 2), usually a short blunt spine in the excision between each crenulation and the next; three or four pairs of setae near the middle and other shorter setae situated more proximad and more laterad, and a number of very short pointed spines near the crenulated distal margin, on the dorsal mental surface; each lateral mental margin in the distal half with 14-21 short conical articulated spines, which series is continued mesad by about 4 similar spines on a thickening near the articulation of mentum and lateral labial lobe; on the ventral mental surface are two pairs of moderately long setae, one pair proximal to, the other pair distal to, the level of articulation of the lateral labial lobes, and many small

*Ent. News, XXII, p. 53, pl. III, Figs. 29, 31.

setae. Lateral labial lobes (Pl. XVII, Fig. 5) with a long tapering terminal articulated spine and two tapering distal teeth, the inner (mesial or ventral) of which is the longer, 6-7 setae between the terminal spine and the base, and a group of 4-6 (8-9 Cordoba) short conical spines on the lateral margin opposite the most proximal seta.

Thorax without well-developed tubercles or other peculiar structures. Mesostigmata latero-dorsal, between prothorax and mesothorax, elongated transversely. Metastigmata smaller, lateral, close to the anterior margin of the somite. In the alcoholic larvæ, the front wing-pads reach to slightly posterior to the middle of abdominal segment 4 (Nos. 1 and 2), or to the anterior edge of 5 (No. 58), the hind wing-pads to the hind end of segment 4 (Nos. 1 and 2) or to the middle of 5 (No. 58). In the (metamorphic) exuviæ, the point reached by the front wing-pads varies from the anterior edge of 4 to one-fourth the length of 4, and that reached by the hind wing-pads from one-third to one-half the length of 4. These differences between the larvæ and the exuviæ are probably due to the distortion produced by the process of exuviation.

Legs slender, with very short hairs on the longitudinal carinæ, tarsi three-jointed with two untoothed claws which are curved and very sharp at the apex (Pl. XVII, Fig. 1), no empodium; on the distal part of the tibiæ and on each lateral margin of the plantar surface of the tarsal joints are one or more rows of strong, trifid (or less frequently quadrifid or pinnate) spines (Pl. XVII, Fig. 4), whose length ranges from .07 mm. to .15 mm.

Abdomen subcylindrical, of ten complete segments, decreasing gradually in width and in height from 1 to 10, without dorsal or lateral hooks, covered with minute hairs .1 mm. long. Viewed ventrally, the lateral margins of each of segments 1-7 widen caudad from the anterior end to two-thirds or three-fourths of the segment's length and thence narrow to the posterior end. Hind dorsal margin of 10 in the middle shallowly concave and produced upward (dorsad).

Rudiments of accessory male genitalia visible under the chitin on the ventral side of abdominal segment 2. Male gonapophyses represented by two strong sharply-pointed spines on the ventral side of 9, situated at three-fourths of the segments' length, about half as long as 9 and projecting ventrad and caudad to the level of the middle of 10.

Female gonapophyses: ovipositor, in the alcoholic larvæ, reaching to the middle (No. 2), or to seven-eighths (No. 58) of abdominal segment 10, in the exuviæ to seven-eighths of 10, or to beyond this segment for a distance equal to about one-eighth of the length of 10; the sharply-pointed genital valves reach to the middle of 10 (No. 2), or 10 barely beyond 10 (No. 58), or in the exuviæ to beyond 10 for as much as one-third of the length of 10.

Rudiments of the superior appendages or 'cercoids' of the imago viewed dorsally half as long, or less than half as long, as 10, digitate, bent more or less ventrad near the middle of their length in the male, nearly straight in the female, pale brownish-yellow. (Pl. XVII, Fig. 8, *sa*).

The three caudal gills much darker in color than the abdomen, lozenge-shaped or diamond-shaped in transverse section of the anterior portion or stalk (which comprises one-half to three-fifths of the total length of the gill), the vertical diameter greater than the horizontal, the four angles distinctly keeled or carinate, the carinæ minutely serrate (less marked on the lateral carinæ of the median gill and on the mesial carina of each lateral gill), each serration bearing a short hair; on the two lateral gills the dorsal serrations are larger and fewer than the ventral serrations, while on the median gill the dorsal serrations are smaller and more numerous than the serrations of the ventral edge. The height of each gill (*i. e.*, its vertical diameter) increases gradually from the base caudad to one-half or three-fifths of the total length and then expands more abruptly into the thinner, foliaceous, terminal portion (Pl. XVII Figs. 12, 13, Pl. XVIII, Fig. 10), which may taper rather rapidly to an acute apex or may end as a fully rounded convexity. The lateral carinæ of the anterior stalk of the gill are not continued on to the terminal foliaceous portion, but the dorsal and ventral carinæ are continuous with the non-serrated but sparsely hairy dorsal and ventral edges of the foliaceous part. The maximum height of the foliaceous part is about twice the maximum height of the stalk. The caudal gills are held in life so that the foliaceous part is vertical (Pl. XVIII, Fig. 11).

The following viscera are described from larva No. 1, the only one which has been dissected as yet.

The fore-gut reaches to the middle of the third abdominal segment, the mid-gut to the anterior end of the seventh abdominal segment (Pl. XVII, Fig. 8). The distinct gizzard is armed with eight larger and eight smaller longitudinal chitinous folds, all bearing teeth (Pl. XVII, Fig. 9), whose formula may be written $8\left(\mathrm{F}\ \frac{5''\pm}{6'\text{-}10'},\ \mathrm{f}\ \frac{2''\text{-}3''}{2'}\right)$ (cf. Higgins, 1901, pages 132, 133, 136.)

The rectum opened longitudinally and spread flat has three wider cellular (glandular?) longitudinal areas, one of which is mid-dorsal, the other two right-ventral and left-ventral respectively, separated by narrower, non-cellular, longitudinal bands (Pl. XVII, Fig. 10). The nuclei of the cellular areas can be seen in the unstained rectum, but become much more distinct after staining (alum carmine was employed). Each of these three cellular areas is supplied with a branching trachea which for the ventral areas is a derivative, direct or indirect, of the lateral trachea of the same side of the body (Pl. XVII,

Fig. 7); the origin of the mid-dorsal rectal trachea was not determined. The three non-cellular longitudinal bands of the rectum had, when the viscus was first opened, the shiny, silvery appearance which suggests enclosed air, but no tracheæ could be followed into these bands. The chitinous lining of these bands was much wrinkled into short folds.

The crop of this larva (No. 1) contained fragments of a smaller larva of the same species which belong undoubtedly to the small larva referred to on page 407 as having been collected at the same time; these fragments were identifiable as follows: A large part of the head, most of the mentum with left labial lobe and much of the right labial lobe still attached, groups of two or more abdominal segments, and two of the caudal gills. The crop also contained a mosquito larva 4.2 mm. long, comprising head, thorax and abdomen all in one piece; and most of the body of a copepod measuring .3 mm. long. The size of these fragments is such as to excite wonder that they were not more minutely subdivided by the mouth-parts, unless indeed their size is due to unusual 'bolting' by the larva under the stimulation of capture. Behind the gizzard the contents of the alimentary canal were much smaller particles and if the food fragments in the crop were not abnormally large, there is here more evidence of a subdividing function in the gizzard than I was able to adduce on another occasion (Calvert, 1899, p. 416).

The arrangement of the principal tracheæ is indicated in Pl. XVII, Figs. 7, 8. It does not differ in any important features from that shown in a large-scale (unpublished) drawing which I made many years ago from a living larva, 2 mm. long, of the European *Agrion puella*. The chief tracheæ of two caudal gills have also been figured (Pl. XVII, Figs. 12, 13) from the preserved material. Unfortunately, no study of the finer tracheoles was made from life, when alone they can be distinctly traced.

The ventral nerve cord consists of suboesophageal, pro-, meso-, and metathoracic pairs of ganglia (these last three in their respective somites and very distinct from each other), and seven pairs of abdominal ganglia as follows: the first in the middle of segment 1, the second near the hind end of 2, the third at the articulation of 3 and 4, the fourth to the seventh in the extreme anterior ends of 5, 6, 7 and 8 respectively.

Developmental Changes in the Larva.

Comparison of larvae Nos. 48, 49, 54, 3 and that (No. 101) recovered from the crop of No. 1 and the exuviae of 58 and 61 listed on page 449, have furnished only the following differences from the above description of the mature larva:

	Larva No. 101	Larva No. 54	Larva No. 48	Larva No. 49	Larva No. 3	Exuvia of No. 61	Exuvia of No. 58	Larva No. 58 (for comparison)
Total length in mm. incl. caudal gills	?	10.5	?	15	17.5	?	?	23
Body length in mm. excl. caudal gills	?	7	11	11.5	14	?	?	19
Width of labium in mm. at level of articulation of lateral lobes	1.3	1.8	2.15	*	2.09	3	3.15	3.67
Number of crenulations on one-half of distal margin of mentum	21	26, 27	29,31	28 ? 28	31.28	34	36, 40	37, 41
Number of lateral spines on distal half of mentum	.....	10	11,13	*	*	15, 16	15	16
Mesostigmata	.....	not visible	visible, but slightly dev'd	not visible	present	present	present	present
Metastigmata	.....	{ Future site marked by a darker point }			present	present	present	present
Front wing-pads reach to	.....	two-thirds of metathorax	two-thirds of abd. seg. 1	hind edge of abd. seg. 1	ant. margin of abd. seg. 1	*	ant. margin of 2	ant. margin of 5
Hind wing-pads reach to	.....	hind edge of abd. seg. 1	one-half of abd. seg. 2	two thirds of abd. seg. 2	ant. edge of abd. seg. 2	*	middle of 2	middle of 5
Points reached by ♀ gonapophyses, viz.:								
Ovipositor: fore pair	.....	one-eighth of 9	two-fifths of 9	hind edge of 9	three-fifths of 9	(♂)	one-fourth of 9	seven-eighths of 10
Ovipositor: median pair	.....	three-fourths of 9	hind edge of 9	hind edge of 9	hind end of 9	(♂)	one-fourth of 9	seven-eighths of 10
genital valves (hind pair)	.....	one-third of 10	one-half of 10	middle of 10	slightly beyond hind end of 9	(♂)	middle of 9	barely beyond 10
Cercoids	.....	.....	.....	one-fifth as long as 10	.....	.....	one-fourth as long as 10	one-half as long as 10
Caudal gills	foliaceous terminal part narrower (pl. xvii, f. 11)	foliaceous terminal part wider	foliaceous terminal part wider (pl. xvii, f. 12)				lost	

* Not determined.

In this table the forms compared have been arranged in order according to size from the smallest to the largest. The increase in total length and in body length is accompanied with increases in the number of crenulations and of spines of the mentum and in the lengths of wing-pads and of female gonapophyses except in larva No. 3. Miss Butler (1904) has found an increase in the number of distal mental crenulations to take place with increasing age in the larva of *Lestes uncatus,* while a lack of constant correlation between increased size and increased length of wing-pads has been noted by Balfour-Browne (1909, p. 278) and Backhoff (1910, p. 654) for larvae of several species of European Agrionines.

A comparison of the last two columns of the table is interesting as showing the amount of change which can take place within ten days after a moult.

General Features of the Larva.

In spite of their unusual habitat, the larvae of *M. modestus* show very few differences from the general Agrionine type of larva, the stalked caudal gills of the later stages being one of these. As in most, perhaps all, Zygopterous larvae, the caudal gills may be lost without interfering with growth, development and transformation (Pl. XVIII figs. 1-7, Pl. XIX fig. 8). Only two features of the larvae seem to be distinct adaptations to their environment, viz., the divided spines of the tarsi and distal ends of the tibiae, and the strongly-curved, sharply-pointed tarsal claws, both classes of structures being apparently of assistance in moving up and down the steeply-inclined or vertical surfaces of the bromeliad leaves. So little has been done, however, in comparing the minuter details of Odonate larvae that it is not certain that these features are peculiar to *Mecistogaster.* It is also important to note that the larva shows nothing of the hypertrophy of the abdomen which is so striking a characteristic of the imago. This great increase in abdominal length is accomplished only at metamorphosis and is clearly brought out by the figures on Plates XVIII and XIX.

TRANSFORMATION.

As related on page 407 the larvae collected at Juan Viñas were brought to Cartago and placed in glass tumblers, The opening of each tumbler was covered with a piece of netting. In the early days of April, 1910, we noted that some of these larvae showed signs of approaching metamorphosis, so we took care that some leaves of the small bromeliad in each glass touched the netting and thus afforded a means whereby the larva could reach the latter and there attach itself for transformation.

On April 4 larva No. 59 had so attached itself and at 8.15 A. M. the splitting of the cuticle on the thorax began. By 8.30 A. M. the thorax, head, legs, wings and first four abdominal segments were disengaged and hanging from the exuvia which was attached to the under side of the netting, the body of the imago being sustained entirely by the hind end of the abdomen which was still within the exuvia; the wings were about 10 mm. long. At 8.40 A. M. the imago was completely free from the exuvia and clinging to the netting by its legs. In the meantime we had set up our camera in a convenient position in our room; then pinned the netting cover with the exuvia and expanding imago on it to the door of the wardrobe and obtained the photographs which are reproduced as figure 8, Plate XVIII, and figures 1-8, Plate XIX. The imago made its first flight at 1.53 P. M. It lived in captivity until April 11.

Larva No. 55 transformed April 6 and, with the experience obtained from No. 59, we were able to secure photographs of earlier stages in metamorphosis (Pl. XVIII, figs. 3-7). The whole series of figures on these Plates, together with their explanation, may dispense with further description here. As will be seen from an examination of them, the great length of abdomen of the imago is a relatively sudden acquisition and is not foreshadowed by the size of the larva. This may be still more appreciated by comparing our figures with those of the transformations of other Odonata as given, for example, by Latter (1904) and Ward (1910). The decrease in thickness of the abdomen between the stages represented in Pl. XIX, figs. 6 and 7 is also noteworthy.

On page 410 a hypothesis as to the usefulness of this long imaginal abdomen has been suggested.

Efforts to secure a pairing between ♂ 55 and ♀ 59 were unsuccessful.

THE SPECIFIC IDENTITY OF THIS MECISTOGASTER.

In the *Biologia Centrali-Americana* (Calvert 1907, p. 354) I was doubtful as to whether Costa Rican examples of *M. modestus* should be referred to the race *iphigenia* Selys or not. In describing *iphigenia* (from Bogota and Panama) de Selys wrote (1886, p. 22): "La seule différence à noter en comparant ces exemplaires au type [de *modestus*] du Mexique, c'est que *dans les deux sexes*. la raie humérale interne est reduite á une virgule basale trés courte," and on the following page he states, "♀ Le bout des quatre ailes blanc laiteux."

The material now before me is more extensive, so far as Costa Rica is concerned, than that available when the *Biologia* was written and consists of the following imagos:

Costa Rica, Juan Viñas (2 ♂ No. 55 and April 28, 1910, and 3 ♀ ♀ Nos. 57, 59, and May 1; also the ♀ by Bruner quoted in Biol Cent. Amer.), Orosi (1 ♀ by Sr. Picado) and Tuis (1 pair in coitu and 1 ♀ June, 1907, by Mr. C. H. Lankester, forwarded by the late Prof. Biolley and now in the Acad. Nat. Sci., Phila.)

Guatemala, Purula (3 ♂ 3 ♀) and Cubilquitz (1 ♀) cited in Biol. Cent. Amer.

Mexico, Presidio in Vera Cruz (2 ♂ 2 ♀) and Atoyac (1 ♀) cited in B. C. A., Cordoba (fragments of two individuals reared by Mr. F. Knab).

The pair from Tuis and the Juan Viñas male of April 28 have fully colored thoraces and on comparing them with the equally well colored examples from Presidio and Atoyac, the internal humeral ray is no shorter in the former than in the latter. The Juan Viñas female by Bruner has this ray of the same length as the other Costa Rican specimens.

As stated in the *Biologia* volume, page 57, one female from Presidio has the tips of the wings milky, as described by de Selys for *iphigenia*; this female has the pterostigma creamy-

white. The other Presidio female and the Atoyac female have the pterostigma reddish and brownish respectively, but the tips of the wings are not milky. All the Costa Rican females now before me have the veins at the apices of the wings white but in none of them is the membrane of the wing as milky as in the first mentioned Presidio female which has the veins at the apex brownish or blackish. My belief, as expressed in the *Biologia*, p. 57, is that reddish and brownish pterostigmata in this species indicate greater age than a white stigma. None of the Costa Rican females before me have red or brown pterostigmata, although two of the males have them dark brown.

Judged by the length of the internal humeral ray there seems to be no reason for separating the Costa Rican specimens from the Mexican, and as milkiness at the apex of the wings of the females is evidently not a geographical character, whatever else its significance may be, I refer all the Costa Rican specimens to *modestus*.

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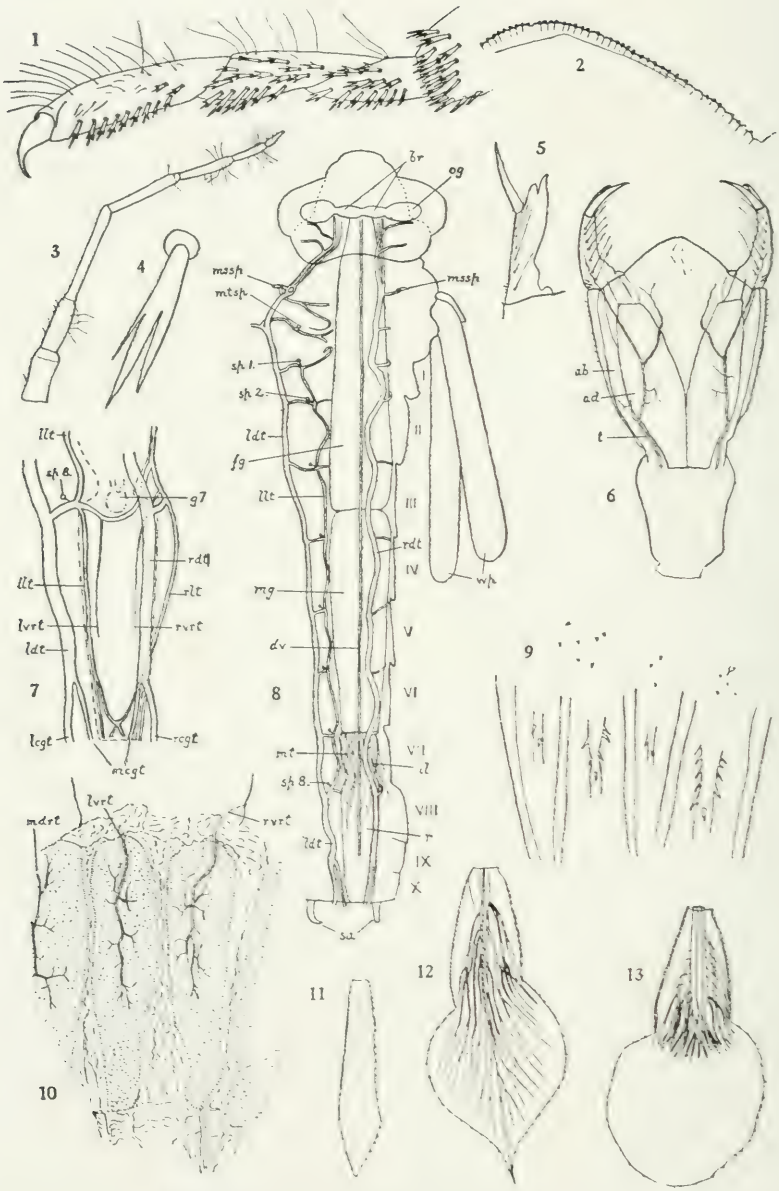


MECISTOGASTER MODESTUS—CALVERT.

Explanation of Plates XVII-XIX.

(All three Plates refer to *Mecistogaster modestus Selys*).

Plate XVII.

Fig. 1. Tarsus and distal end of tibia, larva No. 2. x 33.

Fig. 2. A little more than the right half of distal margin of mentum, dorsal surface, larva No. 1. x 28.

Fig. 3. Right antenna, larva No. 1. x 18.

Fig. 4. A single trifid spine from the proximal tarsal joint of fig. 1, length .07 mm. x 370.

Fig. 5. Lateral labial lobe from exuvia of larva No. 49. x 14.

Fig. 6. Labium, larva No. 1. x 8.

Fig. 7. Principal tracheae supplying the rectum, larva No. 1. The outlines of the ileum and rectum are shown by broken lines. The left dorsal trachea (*ldt*) has been turned to the left out of its normal position. x 9.

Fig. 8. Some of the principal viscera of larva No. 1. The outline of thorax and first seven abdominal segments has been shown on the right side only, the dorsal body-wall being supposed to have been entirely removed from these segments, but its right half retained and spread out to the right in segments 8-10. The dorsal trachea is in normal position on the right (*rdt*), but turned over out of position (*ldt*), and the lateral trachea (*llt*) also exposed, on the left. The dotted lines on the head show the outlines of the compound eyes. x 4½.

Fig. 9. One-fourth of the gizzard armature as seen when the viscus is cut lengthwise and spread out flat, larva No. 1. x 45.

Fig. 10. Inner surface of the rectum, larva No. 1, cut lengthwise to the right of the mid-dorsal line and spread out flat. x 16.

Fig. 11. A caudal gill of larva No. 101. x 9.

Fig. 12, 13. Caudal gills from larvae Nos. 48 or 49 and 1, respectively. x 9.

All these figures drawn by camera lucida and compound microscope.

Abbreviations:

ab, abductor muscle.
ad, adductor muscle.
br, brain (cerebral ganglia).
dv, dorsal vessel.
fg, fore gut.
g7, seventh abd. ganglia
il, ileum.
lcgt, trachea to left caudal gill.
ldt, left dorsal trachea.
llt, left lateral trachea.
lvrt, left ventral rectal trachea.
mcgt, trachea to median caudal gill.
mdrt, mid-dorsal rectal trachea.
mg, mid-gut.
mssp, mesostigma.
mt, Malpighian tubules.
mtsp, metastigma.
og, optic ganglion.
r, rectum.
rcgt, trachea to right caudal gill.
rdt, right dorsal trachea.

rlt, right lateral trachea.
rvrt, right ventral rectal trachea.
sa, superior appendages (cercoids) of imago.
sp. 1, *sp.* 2, *sp.* 8, spiracles of 1st, 2nd and 8th abd. segs., respectively.
t, trachea.
wp, wing pads.
I-X, abdominal segments 1 to 10.

PLATE XVIII.

Figs. 1, 2. Larva No. 55, placed on the netting out of water for comparison.

Figs. 3-7. Larva No. 55, transforming April 6, 1910. Figs 3-5 show the tracheal linings being pulled out of the right thoracic spiracles as white lines.

Fig. 8. Larva No. 59, transforming April 4, 1910, 9.05 A. M. (For continuation of this series see Plate XIX).

Fig. 9. Ventral surface of metamorphic exuvia No. 55.

Fig. 10. Dorsal surface of metamorphic exuvia No. 57. After transformation the exuvial coverings of the gills as they dry become shriveled. In this case special care was taken to spread them out on a piece of paper that they might dry in approximately natural shape attached to the paper.

Fig. 11. Larva No. 57 photographed alive in water, March 2, 1910.

PLATE XIX.

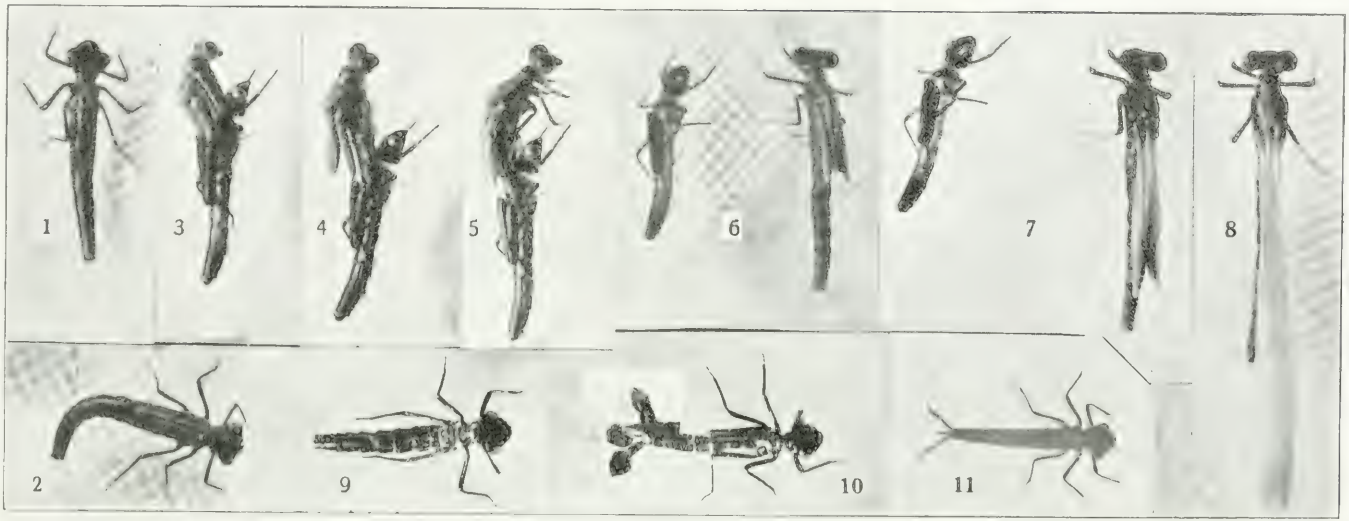
Figs. 1-7. Larva No. 59, transforming April 4, 1910. Between the taking of photographs 3 and 4 the netting was shifted to bring the imago into side-view.

Fig. 8. Metamorphic exuvia of No. 59 after transformation, April 4, 1910, at 10.46 A. M.; 20 mm. long.

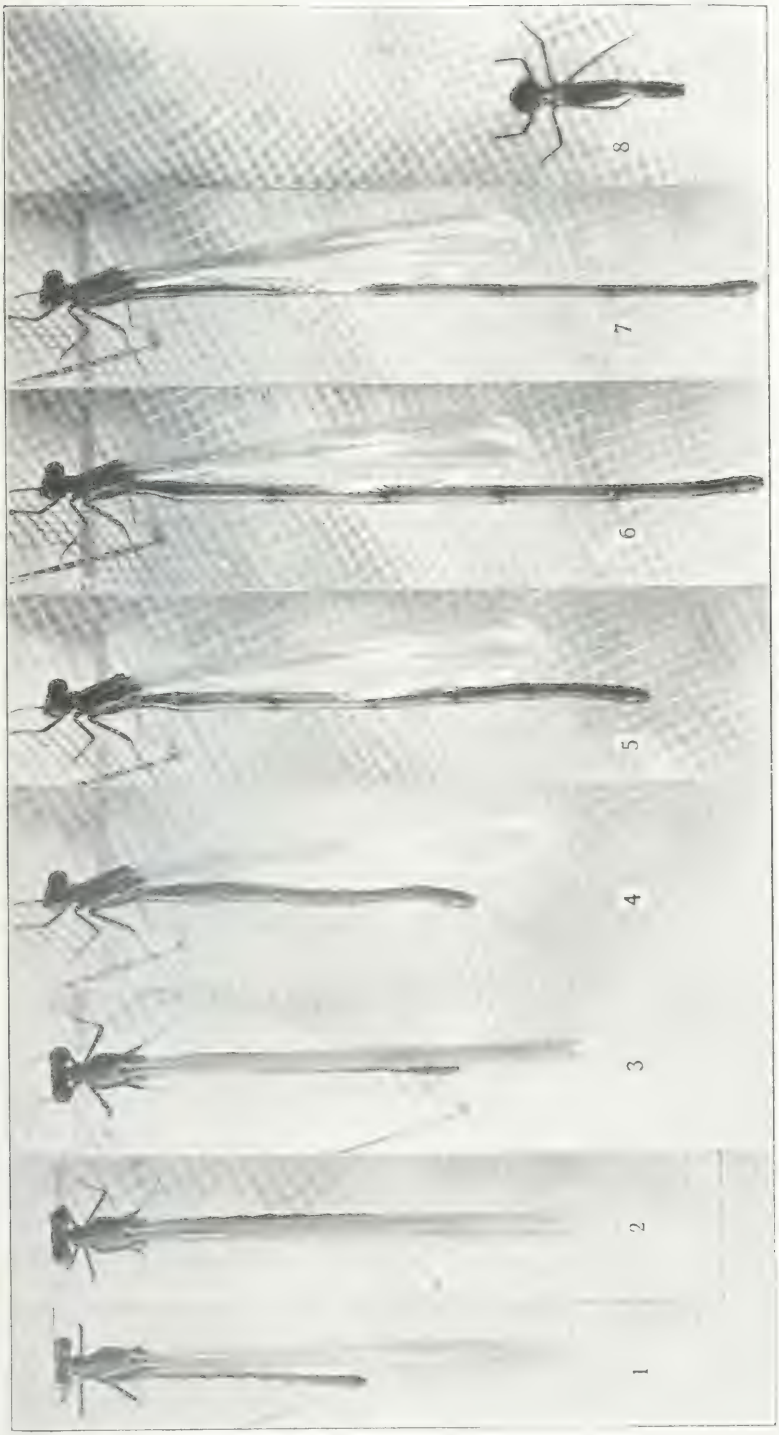
All figures on Plates XVIII and XIX from photographs by Amelia S. Calvert.

THE PECKHAM COLLECTION OF SPIDERS.—The Public Museum of the city of Milwaukee, Wisconsin, has recently received a donation of great value. This is the entire collection of spiders, chiefly Attidæ, from all parts of the world, of Dr. George W. Peckham, whose work on Solitary Wasps and Spiders is so well known. The collection includes many thousands of spiders, among them many species determined by Simon. The types, of which a few are still in the collection, will be sent to Cambridge, where the rest of Dr. Peckham's have been sent. Dr. Peckham included his entire library on Arachnida in this donation. He expects to leave shortly for Central America, probably Guatemala, where he will stay for six months.

R. A. MUTTKOWSKI, Milwaukee, Wis.



MECISTOGASTER MODESTUS CALVERT.



MECISTOGASTER MODESTUS—CALVERT.

Standards of the Number of Eggs laid by Spiders.—I. (Arach.).

Being Averages Obtained by Actual Count of the Combined Eggs from Twenty Depositions or Masses.

By A. A. GIRAULT, Brisbane, Queensland, Australia.

1. EPEIRA SERICATA Clerck. (=SCLOPETARIA Clerck.).

No.	Date 1911	No. counted per mass	Successive Totals	Av. per Egg Mass	Max.	Min.	Range	
1	July 22	236	236	236.			300	
2		227	463	231 5				
3		239	702	234.				
4		337	1039	259.7				
5		182	1221	244.2				
6		254	1475	246.				
7		166	1641	234.				
8		247	1888	236.				
9		182	2070	230.				
10		300	2370	237.	300			
11		279	2649	241.				
12		261	2910	242.5				
13		189	3099	238.				
14		114	3213	229 5		114		
15		236	3449	230.				
16		292	3741	234.				
17		145	3886	229.				
18		165	4051	226.				
19		153	4204	221.				
20		238	4442	222.			114	
20		238	4442	222.	300	114	186	Finals

All of the egg masses of this spider were collected at one time from the sides of windows and beneath the sills, from the under sides of piles of lumber stacked up on the ground, from the sides of wooden structures under projections of all kinds and from other similar situations in a limited area on the western shore of Lake Michigan occupied by an experimental sewage pumping station, Sanitary District of Chicago, Chicago, Illinois. The collection was made during the afternoon of July 22, 1911.

The spider was extremely abundant in this situation, especially along the elevated boardwalks and platforms leading to and from the several experimental sewage filters back of the

plant and bordering on the shores of the lake. Here, after nightfall, their webs were very abundant. An abundance of aquatic dipterous and neuropterous insects in the imaginal stage afforded an ample supply of food. These latter were partly from the sewage and partly from the lake.

Since a single female of this spider probably deposits several or more masses of eggs during its life, the average given should not be taken as the average total progeny of a pair but rather as the approximate average number of eggs per mass.

An Aleyrodes on Euphorbia, and its Parasite (Rhynch., Hym.).

By T. D. A. Cockerell, University of Colorado, Boulder, Colorado.

A short time ago Mr. E. Bethel collected at Glenwood Springs, Colorado, some material of *Euphorbia robusta* badly infested by an *Aleyrodes*. I was able to breed out the adults of the *Aleyrodes*, and also large numbers of an undescribed parasite. This appears to be the first record of *Aleyrodes* on *Euphorbia* in this country, though *A. euphorbiae* Loew was found on *Euphorbia peplus* in Austria. *Euphorbia robusta* is also the food plant of the very interesting moth *Doa ampla* (Grote), which I have bred at Boulder. Dr. Dyar, who kindly determined the moth, will describe the larva.

Aleyrodes pruinosus euphorbiarum n. subsp.

Adult ♀.—(measurements in microns). Length of body 1200; head and legs grey, thorax grey with the scutellum light yellowish; abdomen light clear lemon yellow, with the apex broadly grey, and dorsal markings as in *A. pruinosus;* eyes completely divided; third antennal joint 160; joints 4 to 7 subequal, all together 224; length of antennae about 432; anterior wing about 1595 long and 640 wide; main vein distinctly angulate beyond middle (about 770 from base), but with no upper branch, though this is represented by a slight fold; anterior wings white with a faint greyish patch in apical field; border of wing as in *pruinosus*.

Pupa.—Broad-oval, 1280 microns long, 1040 wide, or sometimes

smaller; nearly black, but variably brownish, becoming brown at sides; usually no fringe of wax, but there is a very easily deciduous fringe in good specimens, about 30 across, finely striate; no dorsal wax; an obscure median keel, and the usual strong transverse sutural marks; a more or less evident pale marginal zone, the edge of which is finely crenulate. Immature specimens are brown. Vasiform orifice triangular; operculum very broad (62 broad and 30 long), truncate apically, much as in *A. amnicola,* except that the sides form a much wider angle with the truncation; lingua 30 broad at broadest part, and extending 27 beyond operculum, the apex broadly rounded, very minutely irregularly beaded, slightly notched on each side just above widest part, below which it rapidly narrows; a dark band crosses the lingua at the widest part.

I had regarded this as a new species, but it was so close to *A. pruinosus* Bemis, found on *Heteromeles* in California, that I thought it prudent to send specimens to Mr. Quaintance to be compared with type material of *pruinosus.* Mr. Quaintance kindly replies that it seems to be structually identically with *pruinosus,* though there are differences in color. He adds that probably *A. spiraeoides* Quaintance will prove to be conspecific with *pruinosus. A. spiraeoides,* also from California, has a bright lemon-yellow pupa and the anterior wings of the adult have two dusky spots. On comparing the *Euphorbia* species with the description and figures of *A. pruinosus,* it seems to differ in having the pupa flatter (certainly not "very convex"), the vasiform orifice more produced apically, and the operculum different. These characters are, however, somewhat evasive, and it seems probable that the insect does not deserve more than subspecific rank. It is rather contrary to expectation, that the form from the arid interior of the country should be characterized by its extremely dark coloration in the pupa.

The parasite, reared from this species in great numbers, is a member of the interesting group Aphelininæ. On looking it up, I found that it would not fit well into any known genus, but combined the characters of *Encarsia* and *Coccophagus.* Specimens were accordingly submitted to Dr. L. O. Howard, who replied: "The truth is, it belongs to a new genus. It has the antennæ of *Coccophagus,* but its wing veins are quite different. I suggest that you make a new genus for it."

MIMATOMUS n. gen.

Runs in Howard's table (Bureau of Entomology, Tech. Ser. No. 12, part iv), to *Coccophagus,* having the wings without a hairless line, the antennæ 8-jointed, with the slender club 3-jointed, the stigmal vein well developed, the marginal a little longer than the submarginal, the hind tibiæ normal, etc. The small size and the parasitism on *Aleyrodes* suggest *Encarsia;* so also does the large stigmal vein, which is directed apicad and is without a definite knob. The tarsi are 5-jointed; eyes very distinctly hairy, the hairs quite long; ovipositor projecting very little beyond the abdomen.

Mimatomus peltatus n. sp.

♀—(measurements all in microns). Length 670; width of head 312; length of anterior wing 720, its breadth 312; length of fringe on its lower margin 30; length of submarginal vein 176, of marginal 208, of stigmal 30, end of stigmal vein to end of wing 304; length of antennal club 152; ovipositor projecting beyond abdomen 27. Black, with the scutellum bright yellow, suffused with brown basally, its surface with an irregular coarse network sculpture; wings clear; antennæ ferruginous; legs pale yellowish or ferruginous, the hind femora and coxae brown. Antennal joints with longitudinal dark lines; scape ordinary; pedicel moderately swollen; funicle joints successively longer, all conspicuously longer than broad; parapsidal grooves straight; axillæ formed as in Howard's figure of *Prospaltella murtfeldtii;* middle tibia 256 long, its spur about three-quarters the length of the basitarsus, but very slender and sharp apically.

Entomological Theses for Doctorates in American Universities. —According to the list of theses offered by those who received the degree of doctor of philosophy from American Universities in 1911, published in *Science* for August 18, 1911, the following bore entomological titles:

University of Chicago, Robert Kirkland Nabours, Mendelian Inheritance in Orthoptera.

Columbia University, Charles Virgin Morrill, The Chromosomes in the Oogenesis, Fertilization and cleavage of Coreid Hemiptera.

Cornell University, Robert Matheson, The structure and Metamorphosis of the Fore-intestine of *Corydalis cornutus* L. Edith Marion Patch, Homologies of the Wing-veins of the Aphididae, Psyllidae, Aleurodidae and Coccidae.

Harvard University, Edward Gaige Titus, Monograph of the species of *Hypera* and *Phytonomus* in America.

University of Cincinnati, Annette Frances Braun, Observations on the Development of Color in the Pupal Wings of Several Species of *Lithocolletes.*

University of Pennsylvania, Norman Eugene McIdoo, Lyriform Organs and Tactile Hairs in Araneads.

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

TO CONTRIBUTORS.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, four weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form and without covers, will be given free, when they are wanted; if more than twenty-five copies are desired, this should be stated on the MS. The receipt of all papers will be acknowledged. Proof will be sent to authors for correction only when specially requested.—Ed.

PHILADELPHIA, PA., DECEMBER, 1911.

There are at least two kinds of sermons, one of them the hortatory. As man is prone to fall into the same evil ways year after year, he must be continually exhorted to reform the same particular bad habit. Herein, we see the chief practical value of sermons hortatory.

So also there are at least two kinds of entomological editorials, one of them the hortatory. Persuaded of the necessity of this sort of editorial utterance, as of the hortatory sermon, we shall make no apology for saying one and the same thing many times in this column, if it appear desirable to do so.

Now we say: Label your insects carefully and fully.

A well-known entomologist writes:

"So much of the material that comes to hand is poorly labeled and it is even common for collectors to send in a lot of specimens to a specialist and expect *him* to label them all in accordance with data given in a letter. Let every man label his own things! (Exceptions may be made for lots of unmounted specimens of the same species)."

In these days when special printers of entomological labels exist and when many have their own micro-printing outfit, there is no excuse for not labeling even a long series of specimens. Each label should bear the name of the locality (nearest town, village or postoffice, if no other exact designation is available)

county, state or country, altitude if not readily and exactly ascertainable from a geographical hand-book, date including year (and the month should *never* be indicated by Arabic numerals, for an American abbreviates October 9, by 10-9, and an Englishmen, 9-10,—not that these are unfailing national characters), and the name of the collector as a clue to the specimen's history.

Some insects will require additional information, as to the plant or the nature of the soil, or the species of animal on which they were taken.

No specimen intended for preservation should be ticketed with a number only and all the information separately recorded under that number in a book. The chances are in favor of book and specimen following different paths in the maze of life whereby the specimen soon passes into the limbo of forgotten things.

To recur to the sermon again: What I say unto You, I say unto All—LABEL!

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

MOSQUITOES FED BY ANTS.—The Javanese ant, *Cremastogaster difformis* Smith, excavates its nests in ends of dead branches. When these nests are placed in unfavorable places they become filled with rain-water, and are abandoned by the ants. In this water the mosquito, *Harpagomyia splendens* de Meijere, lays its eggs, and is not known to occur elsewhere than in association with this *Cremastogaster*. Breeding the ants and the mosquitoes together, E. Jacobson found that the mosquitoes spent much time on an upright rod supporting the ants' nests, rocking their bodies gently to and fro, until an ant ran along the rod between a mosquito's legs. The ant was then caressed and produced a drop of liquid between its wide-opened jaws, which was sucked up by the probosis of the mosquito. The operation is figured by some photographs and drawings on three plates (Tijdschrift voor Entomologie, liv, pp. 158-161, taf. 11-13, 1911). In a description of the larva and pupa of this Culicid, following Jacobson's paper, Prof. de Meijere points out, as of special interest, that, although the adult *Harpagomyia* possesses neither mandibles nor maxillae, rudiments of these mouth parts are present in the pupa.

THE MODE OF INFECTION BY THE CAYOR WORM.—Doctors Rodhain and Bequaert conclude, from their observations in the Congo State, that *Cordylobia anthropophaga* (Grünberg) lays its eggs on the ground. The larvae, known generally as Cayor worms, crawl over the soil until they come in contact with man or a mammal, penetrate the skin and lie in the subcutaneous tissue, causing the formation of tumors. On reaching full growth, the larvae leave the host, fall to the ground, bury themselves and there pupate. This Muscid fly is said to be the most common cause of human or animal myiasis in tropical Africa, from Senegal to Natal. In the region of Bas-Katanga where these investigations were made, dogs appeared to be the principal hosts, although *Cordylobia* larvae were found also in guinea-pigs, a monkey and two white men. The larvae are always localized on those parts of the hosts which come in immediate contact with the soil. (Ann. Soc. Entom. de Belgique, lv, pp. 192-197, 1911).

THE OCCURRENCE OF POLYNEMA CONSOBRINUS GIRAULT IN GEORGIA.—Professor A. L. Quaintance, in charge of Deciduous Fruit Insect Investigations, Bureau of Entomology, U. S. Department of Agriculture, had loaned to me some time ago several specimens of species of Mymaridae among which was a female of the above named *Polynema*. The specimen has been referred to in print before as a *Polynema* reared in connection with *Polynema piceipes* Girault (Psyche, 1905, p. 92). Only recently have I been able to identify it. It has been remounted in balsam from a tag and bears the labels, "Fort Valley, Ga. J. H. Beattie, VI, 29, 1905. Quaintance No. 774. Reared in connection with eggs of *Anthonomus quadrigibbus* Say in *Crataegus* fruit." As the species *consobrinus* has been recorded as a parasite of the eggs of *Enchenopa binotata* Say, it is probable that this specimen came from some membracid or jassid egg concealed within the fruit of the hawthorn.

This specimen is worthy of mention not only because it extends the known distribution of the species, but also because it appears to be a variant. Thus, the proximal tarsal joint of the caudal legs is distinctly longer and more slender than usual, the second tarsal joint of the same legs longer than the distal joint, the first joint subequal in length to the combined lengths of the other three joints, facts which are not true for the comparatively large number of specimens of *consobrinus* which I have seen so far. But the relative length of the joints of appendages is by no means constant in Mymaridæ, there being considerable variation in some cases and because of this I have little doubt that the specimen under consideration is but a variant and not a distinct species. The discal ciliation of the fore wing in this specimen disappears farther out from the base of the wing than is usual, but this also varies somewhat and has no specific value in this case.—A. A. GIRAULT.

Ants paralyzed by the Secretion of a Bug.—E. Jacobson has observed that a Holoptiline Heteropter, *Ptilocerus ochraceus* Montandon, of Java, possesses, on the underside of the second abdominal segment, a tuft of yellow hair (a trichome), which apparently secretes some substance with a flavor agreeable to ants of the species *Dolichoderus bituberculatus* Mayr. On the approach of one of these ants, "the bug is at once on the alert; it raises half-way the front of the body, so as to put the trichome in evidence. * * * The ant at once proceeds to lick the trichome. * * * At this stage of the proceedings the bug does not yet attack the ant. * * * It is surprising to see how the bug can restrain its murderous intention as if it was knowing that the right moment had not yet arrived. After the ant has indulged in licking the tuft of hair for some minutes the exudation commences to exercise its paralyzing effect. * * * As soon as the ant shows signs of paralysis by curling itself up and drawing in its legs, the bug at once seizes it with its front legs and very soon it is pierced and sucked dry." (Tijdschrift voor Entomologie, liv, pp. 175-179, 1911). An accompanying paper by the late G. W. Kirkaldy describes and figures the *Ptilocerus*.

Parasitic Orthoptera.—The rareness of the parasitic habit in this order of insects makes additional information concerning it very welcome. The most famous Orthopterous parasite is *Hemimerus*, for which de Saussure proposed the formation of a new order—Diploglossata. Prof. Dr. Richard Heymons, of the Royal Museum fur Naturkunde, at Berlin, describes his observations on the habits of *Hemimerus talpoides* Walk. in Heft II of the Deutsche Entomologische Zeitschrift for 1911. Dr. Heymons kept in a cage, an East African hamster-rat, *Cricetomys*, infested with 20-25 *Hemimeri*. The behavior of these insects with relation to their host, light and food is discussed at length, and the conclusion is drawn that *Hemimerus* can be considered as neither injurious nor useful to its host. It is not regarded as a parasite in the narrower sense of the word, because it does not injure the rat. On the other hand, the idea of Jordan (1909) that *Hemimerus* and *Cricetomys* are symbionts and that the former benefits the latter by consuming fungi found on the skin of the mammal, is rejected. Heymons, indeed, found spores of fungi in the alimentary canal of *Hemimerus*, but he believes that their occurrence there and on the exterior of the host is incidental to the habits of life of *Cricetomys*. The principal food of *Hemimerus* is the upper horny epidermis of its host, but as the insect not infrequently leaves the rat for short excursions, it consumes other things in addition, Heymons finding plant-cells and chitinous pieces in its digestive tract. *Hemimerus* is quiescent while its host is ac-

tive, and the insects seemed to seek the inguinal region of Heymon's *Cricetomys* at such times, but when the rat was sleeping or quiet, wandered over all parts of the body, rarely attracting any response from the rat. Heymons agrees with Hansen (1894) in considering that *Hemimerus* is most nearly related to the Forficulidae—earwigs—and in this connection it is worth while to mention the discovery, within the last two years, of an earwig, *Arixenia esau,* found in the breast pouch of a naked bat in Sarawak, described by Dr. K. Jordan in 1909, and exhibited at the Entomological Society of London, Feb. 2, 1910.

A Rat-flea as the intermediate host of tape-worms.—The dog-flea and the human flea have long been known to serve as hosts of the cysticercoid stage of the tape worm *Dipylidium caninum.* Dampf recently found a Cysticercoid, supposed to be that of *Hymenolepis nana,* in the flea, *Mesopsylla eucta,* from the jerboa, *Alactaga jaculus.* Nicoll and Minchin have now found two species of Cysticercoids in the body cavity of the rat-flea, *Ceratophyllus fasciatus.*

One of these Cysticercoids has been proved to be the larval form of *Hymenolepis diminuta;* it "occurred in about four per cent. (8 in 207) of all the fleas examined during a period of thirteen months. It was found in the body cavity and usually only one specimen at a time. As many as three, however, had been found in one flea." Feeding experiments to determine the identity of the Cysticercoid were performed on a litter of young rats, separated from their mother, isolated, and kept under observation until it was certain that they were free from tape-worms. After three months, fleas were mashed up with their food, and nineteen days later mature tape-worms (*Hymenolepis diminuta*) and their ova were found in the intestine of the rats and in the rats' fæces respectively. It is thought that only the oldest and largest flea-larvae are capable of ingesting the tape-worm eggs and that no development of these eggs takes place until the beginning of the pupal stage.

Of the other Cysticercoid, only one specimen has been found in *Ceratophyllus fasciatus.* From a microscopic examination and comparison with the known tape-worms of rats, "the authors were forced to the conclusion that this Cysticercoid must either be referred to *H[ymenolepis] murina* or to some other as yet undescribed form, the scolex of which was indistinguishable from that of *H. murina.*" This discovery is of special interest; first, because it has been believed that *H. murina* dispensed altogether with an intermediate host, passing its encysted stage in the walls of the intestine of the rat itself; second, because some have considered *H. murina* to be identical with *H. nana,* a dangerous tape-worm of man; and third, because no inter-

mediate host has yet been discovered for *H. nana.* "Rats certainly ingested a large number of fleas from time to time, but it was difficult to imagine that they would acquire a very large infection with *H. murina* by this means; and if *H. nana* be identical with *H. murina* it was scarcely conceivable that a human being could accidentally swallow a sufficient number of fleas to give rise to an infection of over a thousand tape-worms, as was frequently found to be the case. It would still, therefore, be necessary to admit that the development of *H. murina* usually took place without an intermediate host, but that occasionally the rat-flea might function as such. With such a conclusion the life-story of *H. murina* became even more remarkable than before." (Proc. Zool. Soc., London, 1911, part I, pp. 9-13, with figures of the two Cysticercoids.)

Means of transporting fungi by the Ambrosia-beetles.—In the current volume, No. 7, of *Entomologische Blätter* (which describes itself as an International Monthly for the Biology of European Beetles with special reference to Forest Entomology), Strohmeyer describes and figures in halftone some of the very curious bunches of bristles to be found on the heads of the females only of various species of Platypodidae. As in certain species (*Mitosoma* sp.) he found clumps of Ambrosia fungus always adhering to the bristles, he infers that the latter serve to transport the fungus from one place to another. In conclusion he remarks that in a very large number of Platypodidae, perhaps in more than half of all the species, a special apparatus for the transport of fungus is lacking. Why are not all Platypodid females so provided? To answer this question it is necessary to glance at the habits and character of the food of these beetles. According to the mutually confirmatory researches of Hubbard* and Neger† the fungi of different Ambrosia beetles are different, the species of fungus depending not on the kind of tree in which the beetle lives, but on the species of beetle. It therefore results that the introduction of the fungus into new brood-tunnels must be brought about—unconsciously of course—by the beetle itself. Dr. Neger has shown that the fungi which are associated with the German species of *Xyleborus* and *Xyloterus* discharge their spores not as dust but in slimy balls, which easily adhere to the unevenesses of the elytra and to the hairs. A fungus with such peculiarities requires no special apparatus for its transport on the part of its symbiotic beetle. Only when the fungus is wholly or in part unable to be attached to the beetle does the need of some special modification of the insect arise.

* The Ambrosia beetles of the United States. Bull. No. 7, U. S. Dept. Agric., 1897.

† Aus der Natur IV, p. 921, 1908. Zeitschr. f. Land- u. Forstwirtsch., 1908, p. 274. Zentr. Bact. Par. Abt. II, Bd. XX, p. 279.

To the Entomological Research Committee the Natural History Museum owes a beautiful enlarged model of the tropical rat-flea (*Xenospylla cheopis*), which appears to be the main vehicle in the conveyance of bubonic plague to the human subject. The species is believed to have been a native of North Africa, but is now practically cosmopolitan. The model is about 12 inches in length. (*Nature*, July 13, 1911).

Entomological Literature.

COMPILED BY E. T. CRESSON, JR., AND J. A. G. REHN.

Under the above head it is intended to note papers received at the Academy of Natural Sciences, of Philadelphia, pertaining to the Entomology of the Americas (North and South), excluding Arachnida and Myriapoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species, will be recorded. The numbers in **Heavy-Faced Type** refer to the journals, as numbered in the following list, in which the papers are published, and are all dated the current year unless otherwise noted. This (*) following a record, denotes that the paper in question contains description of a new North American form.

For record of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington.

2—Transactions, American Entomological Society, Philadelphia. **4**—The Canadian Entomologist. **6**—Journal, New York Entomological Society. **7**—U. S. Department of Agriculture, Bureau of Entomology. **9**—The Entomologist, London. **10**—Nature, London. **11**—Annals and Magazine of Natural History, London. **12**—Comptes Rendus, L'Academie des Sciences, Paris. **14**—Proceedings, Zoological Society of London. **21**—The Entomologist's Record, London. **22**—Zoologischer Anzeiger, Leipzig. **35**—Annales, Societe Entomologique de Belgique. **40**—Societas Entomologica, Zurich. **50**—Proceedings, U. S. National Museum. **68**—Science, New York. **72**—Transactions, Kansas Academy of Science, Topeka. **84**—Entomologische Rundschau. **92**—Zeitschrift fur wissenschaftliche Insektenbiologie. **102**—Proceedings, Entomological Society of Washington. **107**—Revista, Museu Paulista, S. Paulo, Brazil. **152**—California Agricultural Experiment Station, Berkeley. **159**—Bollettino, Laboratorio di zoologia generale e agararia della R. S. Superiore d'Agricoltura in Portici. **179**—Journal of Economic Entomology. **180**—Annals, Entomological Society of America. **198**—Biological Bulletin, Marine Biological Laboratory, Woods Hole, Mass. **251**—Annales, Sciences Naturelles, Zoologie, Paris. **271**—Fauna Artica, herausgegeben von Dr.

F. Romer und Dr. F. Schaudinn, Jena. **346**—Fauna Exotica, Mitteilungen aus dem Gebiete der exotischen Insektenwelt, Frankfurt am Main. **348**—State of Connecticut Geological and Natural History Survey, Hartford, Conn. **349**—Zoologische Annalen, Zeitschrift fur Geschichte der Zoologie, Wurzburg.

GENERAL SUBJECT. **Bethune-Baker, G. T.**—"The latest in nomenclature," **21,** 1911, 263. **Britton, W. E.**—Guide to the insects of Connecticut, Pt. I, **348,** Bul. No. 16, 38 pp. **Gillett, J. A.**—Insects feeding on "slime flux" of trees, **10,** 1911, 516. **Gregory, J. W.**—The scientific misappropriation of popular terms (mentions insects), **10,** 1911, 538-541. **Luederwaldt, G.**—Os insectos necrophagos Paulistas, **107,** viii, 414-533. **Pocock, R. I.**—On the palatability of some British insects, with notes on the significance of mimetic resemblances; with notes upon the experiments by E. P. Poulton, **14,** 1911, 809-868. **Prout, L. B.**—Descriptions or figures? **21,** 1911, 263-265. **Scudder, S. H.**—Obituary by H. J. Turner, **21,** 1911, 255-256. Obituary by T. D. A. Cockerell, **68,** 1911, 338-342. **Shelford, R.**—Sparrow v. butterfly, **21,** 1911, 245. **Silvestri, F.**—Contributo alla conoscenza dei mirmecofili del Messico, **159,** v, 172-195 (*). **Smith, J. B.**—Report of the Entomological Department of the N. J. Agr. College Exper. Station, New Brunswick, N. J., for the year 1910, 300-424 pp.

APTERA AND NEUROPTERA. **Hilton, W. A.**—The structure of the central nervous system of Corydalis larva, **180,** 1911, 219-256. **Navas, L.**—Neuropteros del Brazil por el Reo Padre, **107,** 476-481. **Parker, W. B.**—California redwood attacked by Termes lucifugus, **179,** 1911, 422-423. **Silvestri, F.**—Contributo alla cònoscenza dei Machilidae dell'America settentrionale, **159,** v, 324-352 (*). Materiali per lo studio dei Tisanuri. Un novo genere e undici specie nove di Japygidae dell'America settentrionale, **159,** v, 72-87 (*). **Wodsedelek, J. E.**—Phototactic reactions and their reversal in the may-fly nymphs Heptagenia interpunctata, **198,** xxi, 265-271.

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LEPIDOPTERA. Banks, C. S.—A manual of Philippine silk culture, Department of the Interior, Bureau of Science, Manila, 53 pp. **Barnes & McDunnough.**—New species and genera of N. A. Lepidoptera, **6,** 1911, 151-162 (*). **Bethune-Baker, G. T.**—Lepidopterology, **21,** 1911, 271. **Bordas, L.**—L'appareil digestif et les Tubes de Malpighi des larves des Lepidopteres (suite et fin), **251,** xiv, 193-273. **Bryk, F.**—Apollinische liebe, **40,** 1911, 50-52. **Chapman, T. A.**—Lepidopterology—no description of a species valid without a figure, **21,** 1911, 239-240. Viviparous butterflies, **21,** 1911, 233-234. **Forbes, W. T. M.**—A structural study of the caterpillars, II: The Sphingidae, **180,** 1911, 261-279. **Grossbeck, J. A.**—Utetheisa bella var. nova, **6,** 1911, 196-198. **Hampson, G. F.**—Descriptions of new genera and species of Syntomidae, Arctiadae, Agaristidae and Noctuidae, **11,** 1911, 394. **Hormuzaki, C. F.**—Die systematische und morphologische stellung der bukowiner formen von Melitaea athalia und M. aurelia, **92,** 1911, 213-218. **Michael, O.**—Lebensweise und gewohnheiten der Morpho des Amazonasgebietes. Beobachtungen uber vorkommen und lebensweise der Agriasarten des Amazonasgebietes, **271,** i, 13-20 (cont.). **Pierce, F. N.**—Viviparity in Lepidoptera, **9,** 1911, 309-310. **Pocock, R. I.**—The distastefulness of Anosia plexippus, **10,** 1911, 484-485. **Prell, H.**—Biologische beobachtungen an Termiten und Ameisen, **22,** 1911, 243-253. **Reiff, W.**—Experimente an uberwinternden Lepidopterapuppen, **92,** 1911, 235-237 (cont.). **Smith, J. B.**—New species of Noctuidae for 1911, No. 1, **6,** 1911, 133-151 (*). **Strand, E.**—Eine neue, riesenhafte Gelechiide aus Ecuador, **84,** 1911, 151. Zwei neue sudamerikanische formen von der lepidopteren-familie Riodinidae (Erycinidae), **84,** 1911, 150. **Walker, E. M.**—Rare captures of Lepidoptera, **4,** 1911, 340. **Wolley-Dod, F. H.**—Further notes on Alberta Lepidoptera, **4,** 1911, 329-339.

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A Manual of Philippine Silk Culture. By Charles S. Banks (from the Entomological Section, Biological Laboratory, Bureau of Science, Manila, Philippine Islands), 53 pages and 19 plates.

The introduction of silk culture into these islands, if it could be made a profitable industry, would be very desirable. This work is intended to collate data and interest those who may wish to take up the commercial production. "The Bureau of Science made the first attempt to import and to propagate mulberry silkworms into the Philippine Islands six years ago." A historical account is given of the attempts of the missionaries in the early eighties and also of the later efforts. The life history of the species is given in detail. An account is also given of the eri or castor silkworm (*Attacus ricini*) and of the wild silkworms of the islands. The proper "silk house" is described and also the varieties of mulberry and their cultivation. The manufacture, reeling, etc., and the quality of silk is also discussed.

In summing up the author says "We have now carried on a sufficient number of experiments with both mulberry and eri silkworms in the Philippines to warrant the statement that this industry can be carried on here under conditions as favorable as those which obtain in the best silk producing countries of the world and with the added advantage that no disease has appeared among the insects, or on the trees used for feeding them." The work is a very useful one and will doubtless stimulate an interest in the subject.—H. S.

THE EUPLEXOPTERA AND ORTHOPTERA OF CONNECTICUT. By Benjamin Hovey Walden. Bull. No. 16, Connecticut State Geol. & Nat. Hist. Survey, Guide to the Insects of Connecticut, pt. II, pp. 41-169, Pls. VI-XI, 63 text figures. 1911.

The author of the above paper and the editor of the Guide to the Insects of Connecticut, Dr. W. E. Britton, are to be congratulated on the appearance of this very interesting and useful work. In an introduction of three pages the author reviews previous work which had been done on the Connecticut Orthopterous fauna, as well as giving such acknowledgements and abbreviations of collectors' initials as are necessary. The systematic treatment is comprehensive, with keys to the genera and species and diagnoses for each, while the distribution within the state is summarized in the more generally distributed forms and the localities indicated in the scarcer and more localized forms. The arrangement is in accordance with Scudder's 1900 Catalogue, while the keys of genera and species are chiefly from Morse and Blatchley.

The numerous text figures, a portion of which are original, assist very greatly in a clear understanding of the text, making the work of value to the specialist as well as to the local student.

The number of species treated is one hundred and nine, of which one hundred have been recorded from the state, the remaining nine being included on the probability of their occurrence within the state.

From the nomenclatural standpoint the names are not in all cases those used by most authors at this date, *i.e.*, *Tettix* instead of *Acrydium*, *Stenobothrus* instead of *Chorthippus*, *Locustidae* instead of *Tettigonidae*, and *Xabea* instead of *Neoxabea*, but this is probably due to a close adherence to Scudder's Catalogue, although other recent changes, as *Blattella* for *Phyllodromia*, have been made.

The general character of the work is excellent and it will stand with Blatchley's Orthoptera of Indiana as the best type of a state catalogue of insects, more of which we hope will be forthcoming in the future.

The only suggestion we can make for the authors of such works in the future, and one based on considerable experience in mapping the distribution of Orthoptera, is that enough localities be cited for

even the commonest and most widely spread species to enable those studying the distribution of species in a comprehensive fashion, to utilize such records in their own work. Frequently a general statement of distribution must later, when more evidence is in hand, be qualified by zonal or environmental restriction. (J. A. G. R.)

Doings of Societies.

FELDMAN COLLECTING SOCIAL.

Meeting of June 21st, 1911, at 1523 South Thirteenth Street, Philadelphia. Fifteen members present, Mr. John Green, of Easton, Pa., visitor. President Haimbach in the chair.

Dr. Skinner described his recent visit to the Carnegie Museum in Pittsburg, Pa., where he studied the Edwards collection of Lepidoptera. He said he had had his doubts as to the validity of certain species which Edwards described and mentioned one, as being satisfactorily placed by himself before studying the type material; *Pamphila viris* which is a topomorph, a northern form of a California species described by Boisduval. The collection as a whole is very poorly arranged.

He also said that *Nodonota puncticollis* Say (Col.) has been very destructive to rose bushes at Ardmore, Pa., since 1909, eating everything but the roots. Dr. Dixon had reported it to him as feeding this year on the tops of red oaks at Black Rock Farm, Gladwyn, Pa.

Mr. Daecke exhibited a box of several orders of insects showing the diversity of one day's catch at Inglenook, Pa., May 30, 1911, and pointed out the following as interesting: *Leptura octopunctata* Say, and *Toxotus trivittatus* Say (Col.) both found on *Viburnum acerifolium* Linn. the former common and the latter rare, saying they were so thickly covered with pollen as to look like lumps on the flower; *Emmesa labiata* Say (Col.) one specimen; a Microlepidopter, a species of *Micropteryx*, and the following Diptera: *Coenomyia ferruginea* Scop., *Xiphura fumipennis* O. S., *Nephrocerus daeckii* Johnson (of which there are only six specimens known), *Laphria sericea* Say

(quite common) and several Syrphids. A shrub, *Hydrangea arborescens* Linn. along a path seems to be the favorite feeding place of *Trichius bibeus* Oliv. (Col.).

Mr. C. T. Greene exhibited and recorded the following Diptera: *Nephrocerus daeckii* Johnson, Roxboro, June 10, 1911, and *Temnostoma pictula* Williston, same place, June 11, 1911, both collected by himself.

Mr. Hoyer exhibited several specimens of a species of Platyptera, *Chauliodes fasciatus* Wlk., saying it was very common along Cobb's Creek west of Sixty-ninth Street, May 28th.

Meeting of September 20th, 1911, at 1523 South 13th Street, Philadelphia, President Haimbach in the chair, thirteen members present.

Mr. Daecke mentioned a trip to Hunter's Run, Pa., July 2, 1911, where, although the place had been burned over, collecting was very rich. Among the rarities were *Neoclytus scutellaris* Oliv. on oak, and *Leptura emarginata* Fab. (Col.)

Mr. Harbeck described the trip taken by himself and Mr. C. T. Greene this year to Pocono Lake, Pa., the week of July 9th, to collect Diptera, saying that many species rare here are common there, and many of those common there are not found here at all. A box of various orders was exhibited.

Mr. Hoyer said that two specimens of *Goes tigrina* De G. (Col.) had been taken flying around a house in the neighborhood of Haines and Chew Streets, Germantown, Philadelphia, about July 8th.

Mr. Schmitz said that at Anglesea, September 3, he had witnessed the nuptial flight of ants which lasted about an hour, from 6 to 7 P. M. He had seen a Mantis *Paratenodera* feeding upon a Cicada.

Mr. C. T. Greene exhibited and recorded the following Diptera from Pocono Lake, Pa.: *Pyrophaena granditarsus* Forster, VII, 12, and *Sericomyia militaris* Walker, VII, 11, both collected this year by himself and thinks they are the first records from this State.

Mr. H. A. Wenzel described in detail his trip to Texas with

Mr. Green, of Easton, and the hardships they encountered there. Photographs and colored cards of some places visited were shown, also the material so far mounted, among which were sixteen specimens of *Plusiotis woodi* Horn and two of *P. gloriosa* LeC., the latter being about half the size of those taken in Arizona.—Geo. M. Greene, *Secretary*.

AMERICAN ENTOMOLOGICAL SOCIETY.

Meeting of June 12, 1911. Dr. Philip P. Calvert, president, in the chair. Eight persons present.

Mr. Cresson reported the death of Mr. J. W. McAllister, on May 28th, aged seventy-five years. He was an organization member, and served many years as a member of the Finance Committee.

The death of John Meichel, a member, who died in October, 1909, was announced.

The President reported the death of S. H. Scudder, on May 17th. He was elected a member of the Society, October 14, 1861.

Dr. Skinner made some remarks on the destructiveness of *Nodonota puncticollis* in Montgomery County, Pa.

Dr. Calvert exhibited four excellently preserved fossil wings of the dragonfly *Phenacolestes* from Florissant, Colorado, sent by Prof. T. D. A. Cockerell for study. This genus belongs to the legion Podagrion of De Selys. As far as the speaker had been able to compare these fossils with living forms, they showed a greater number of resemblances to the genera *Philogenia*, of Costa Rica and Tropical South America, *Megapodagrion* of Tropical South America and *Argiolestes* of Celebes, New Guinea and Australia than to any others known to him.

Meeting of October 26, 1911. Dr. Philip P. Calvert, president, in the chair. Twelve persons in attendance.

Mr. Wenzel referred to some remarks made by Dr. Skinner

at the last meeting of the Feldman Social, on the destruction of hickory trees at Ardmore, Penna., by a bark beetle and said an illustrated article on the subject of the destruction of trees of this species had appeared in the issue of "Country Life in America," for October 15th.

Mr. West exhibited speciments of *Catocala*, among them being the beautiful *C. nivea* from Japan; also some Pierids in Denton glass mounts.

Mr. Rehn exhibited a specimen of *Acridoxena hewaniana*, a peculiar Locustid from the Cameroons, West Africa, and a pair of *Corycus abruptus*, another Locustid, from tropical Africa. The latter species exhibits great sexual dimorphism, the male tegmina being enormously inflated and modified into sounding boards for the tympanum, while in the female the tegmina are single, vertical and unmodified.

Mr. E. T. Cresson, Jr., exhibited a specimen of *Clanoneurum* (Diptera) which he determined as *infumatum* Becker, and said it was curious that the species occurred in America as it was identical with specimens described from Egypt under that name. He gave a history of the genus, which was erected for the Egyptian *infumatum* of Becker. A species from the Balkan region has also been described by Strobl, and Czerny found a form in Spain and suggests that they are all the same species. The speaker coincided in this opinion, having found a representative in Arizona and Southern California, which in every respect agrees with Becker's description of *infumatum*.

Dr. Calvert made a communication on Bromeliad insects found in Costa Rica (published in the NEWS for November and December).

Mr. C. T. Greene reported the capture of *Trichopoda lanipes* at Castle Rock, Penna.

Mr. Andrew Gray Weeks, of Boston, presented some engravings of the late W. H. Edwards and S. H. Scudder.

The Curator reported that the work of removing the insects to temporary quarters began yesterday, and that it would take a week to remove everything in the entomological rooms.—

HENRY SKINNER, *Recording Secretary.*

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AND

PROCEEDINGS

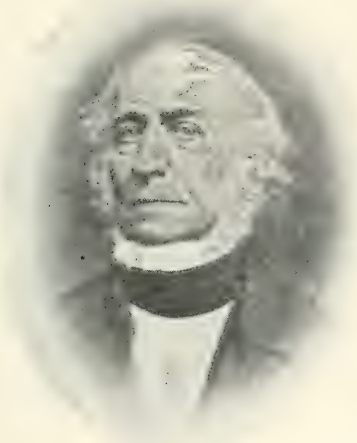
OF THE

ENTOMOLOGICAL SECTION

OF THE

Academy of Natural Sciences of Philadelphia.

VOLUME XXII, 1911.



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February . . .	Jan. 30, 1911
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